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(54) **ADAPTER ASSEMBLY OR OTHER MOUNTING FEATURES FOR FIREARM OPTIC**

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Publication Classification

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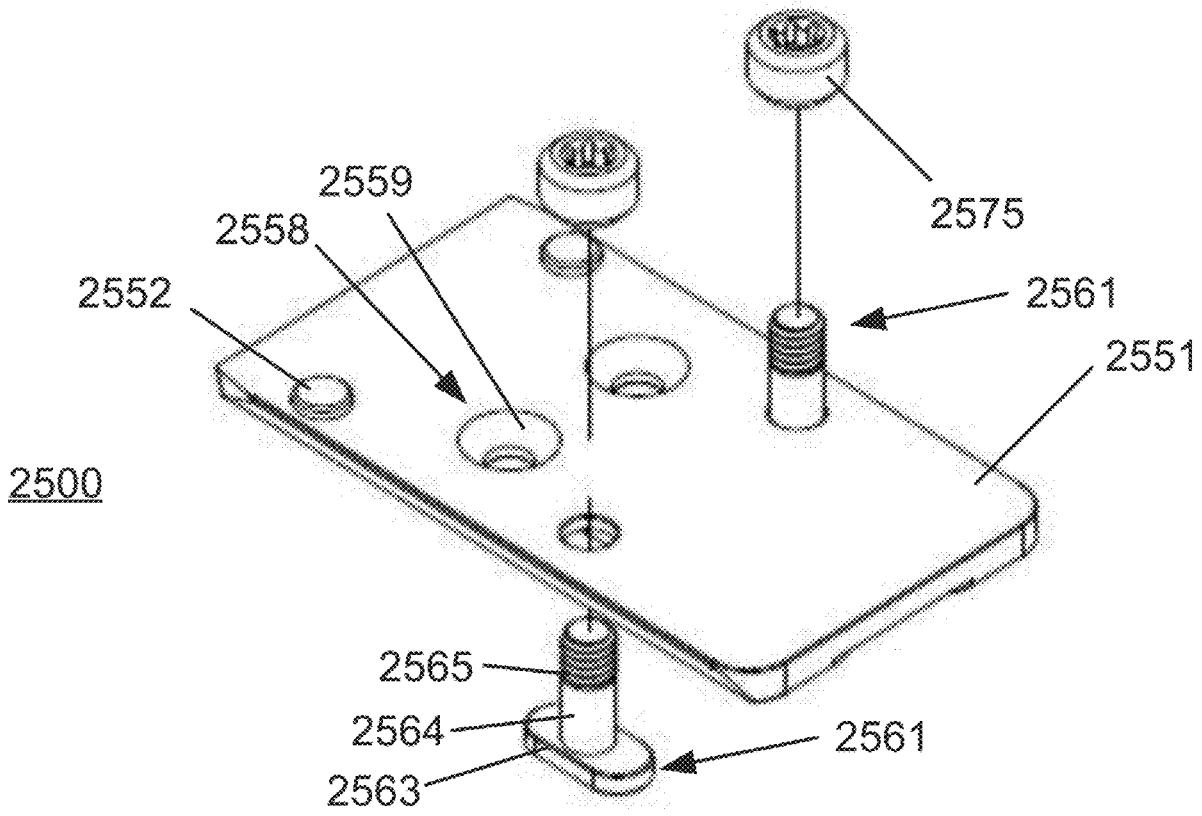
F41G 11/00 (2006.01)

(52) **U.S. Cl.**
CPC ***F41G 11/001*** (2013.01)

(57) **ABSTRACT**

An adapter assembly for mounting an optic on a firearm using nuts mountable on bolts, threaded studs, or threaded posts is provided. The adapter assembly may include a bracket having a bottom section to mount to a firearm assembly, and a top side to receive the optic; wherein the threaded posts are integrally formed on the top side of the bracket, or wherein the bracket includes: pockets arranged to mate with at least part of heads of the bolts or studs, the pockets on a bottom side of the bracket; and through openings to receive shanks of the bolts or a different part of the heads of the bolts, or shanks of the studs. Other embodiments may be disclosed and/or claimed.



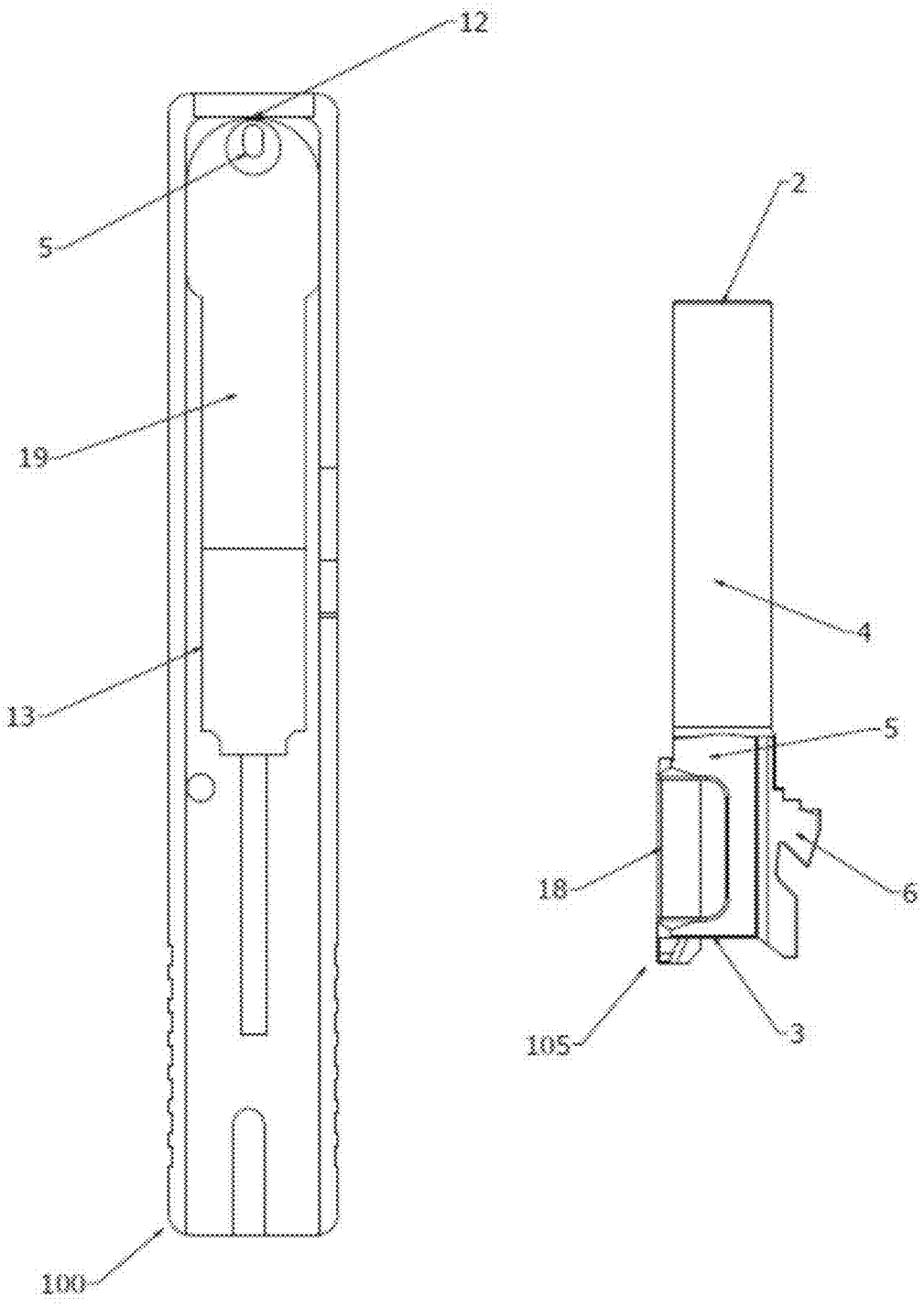


FIG. 1A
(Background)

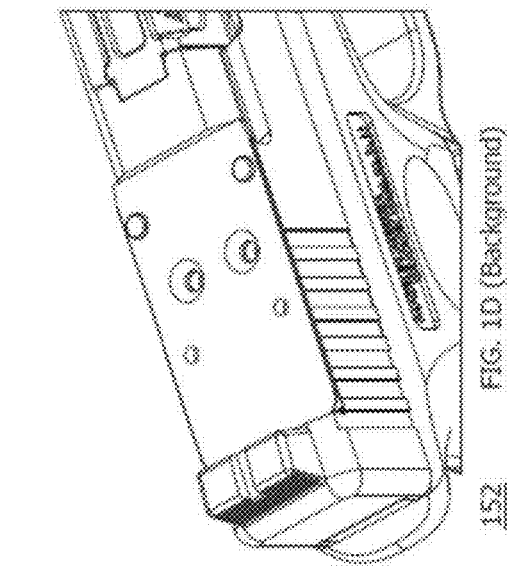


FIG. 1D (Background)

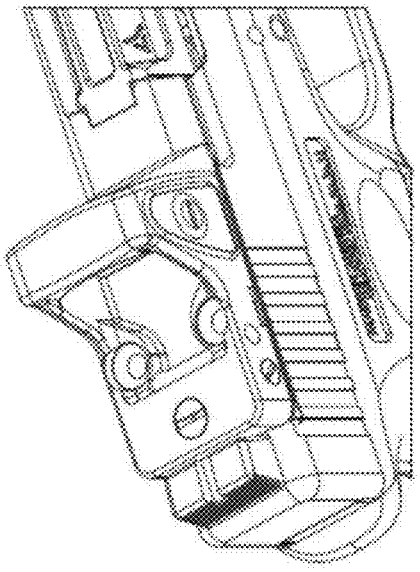


FIG. 1G (Background)

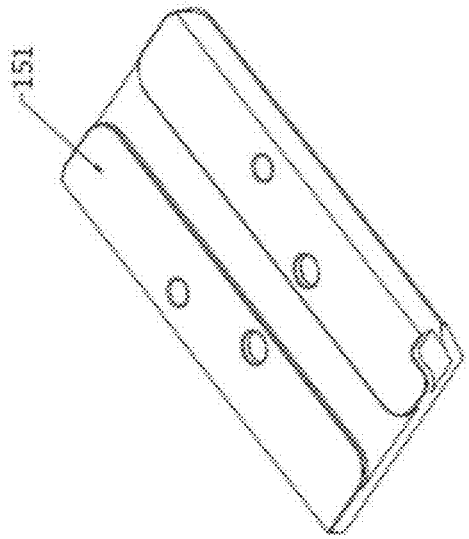


FIG. 1C (Background)

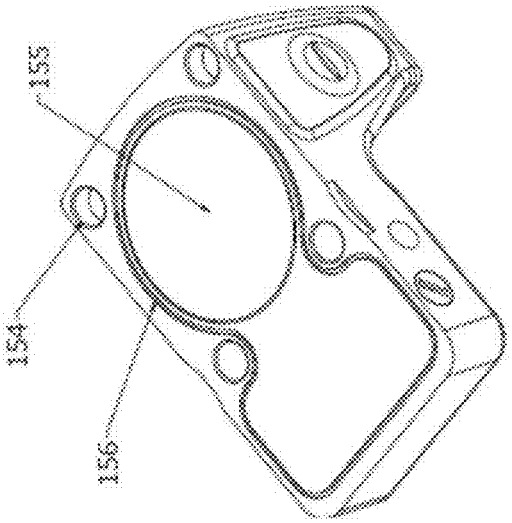


FIG. 1F (Background)

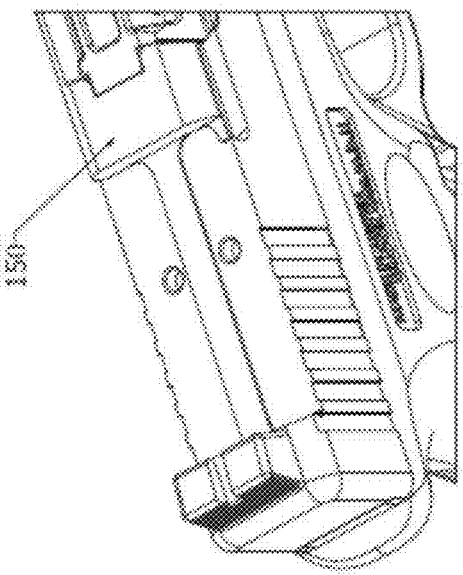


FIG. 1B (Background)

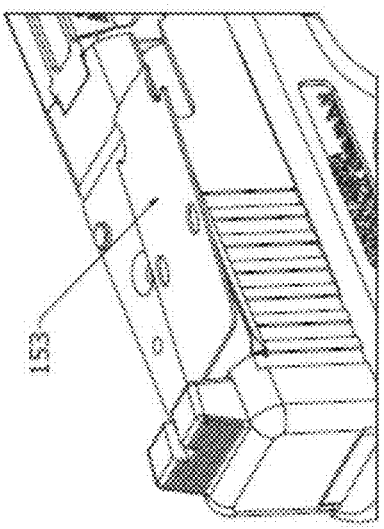


FIG. 1E (Background)

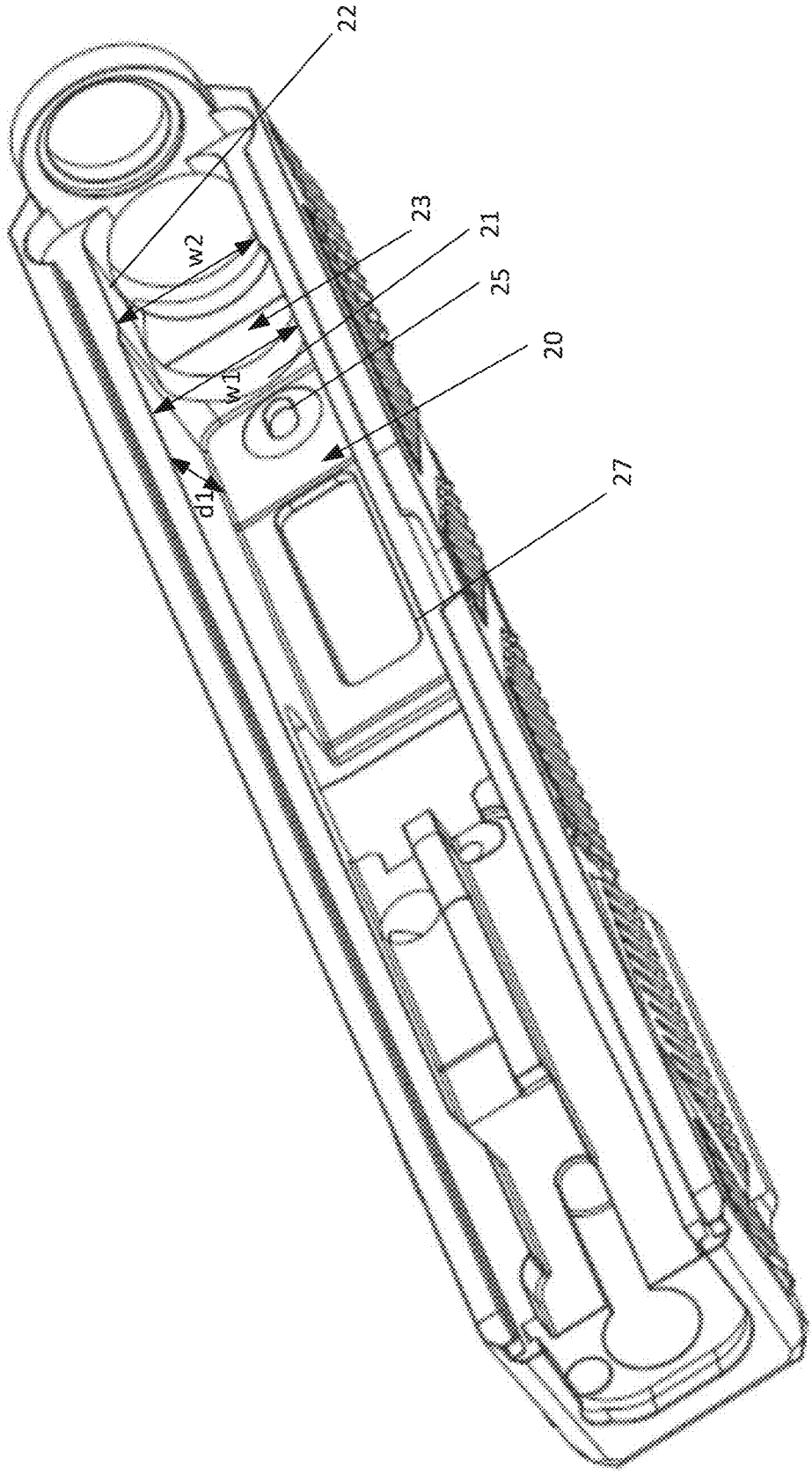


FIG. 2A

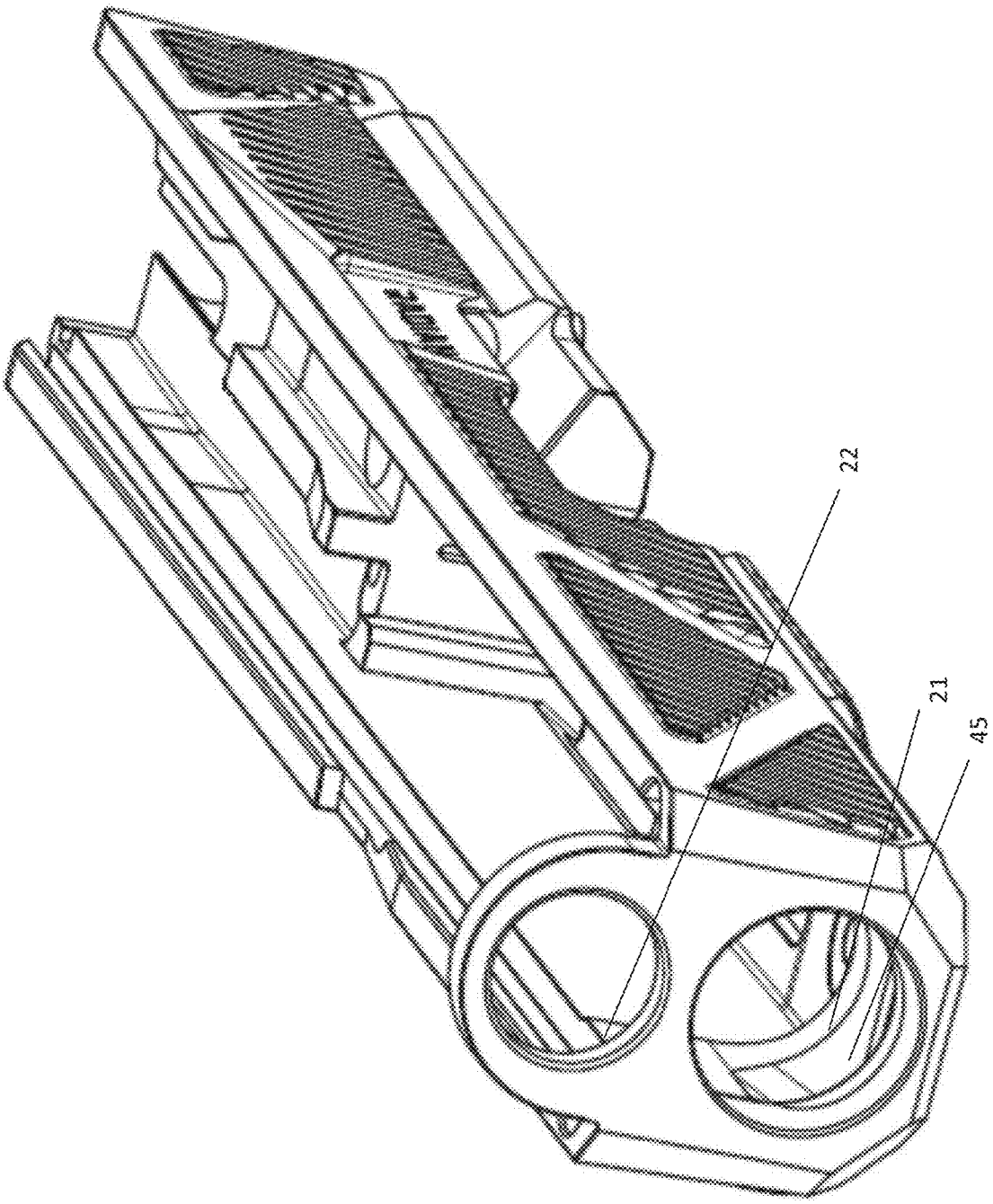


FIG. 2B

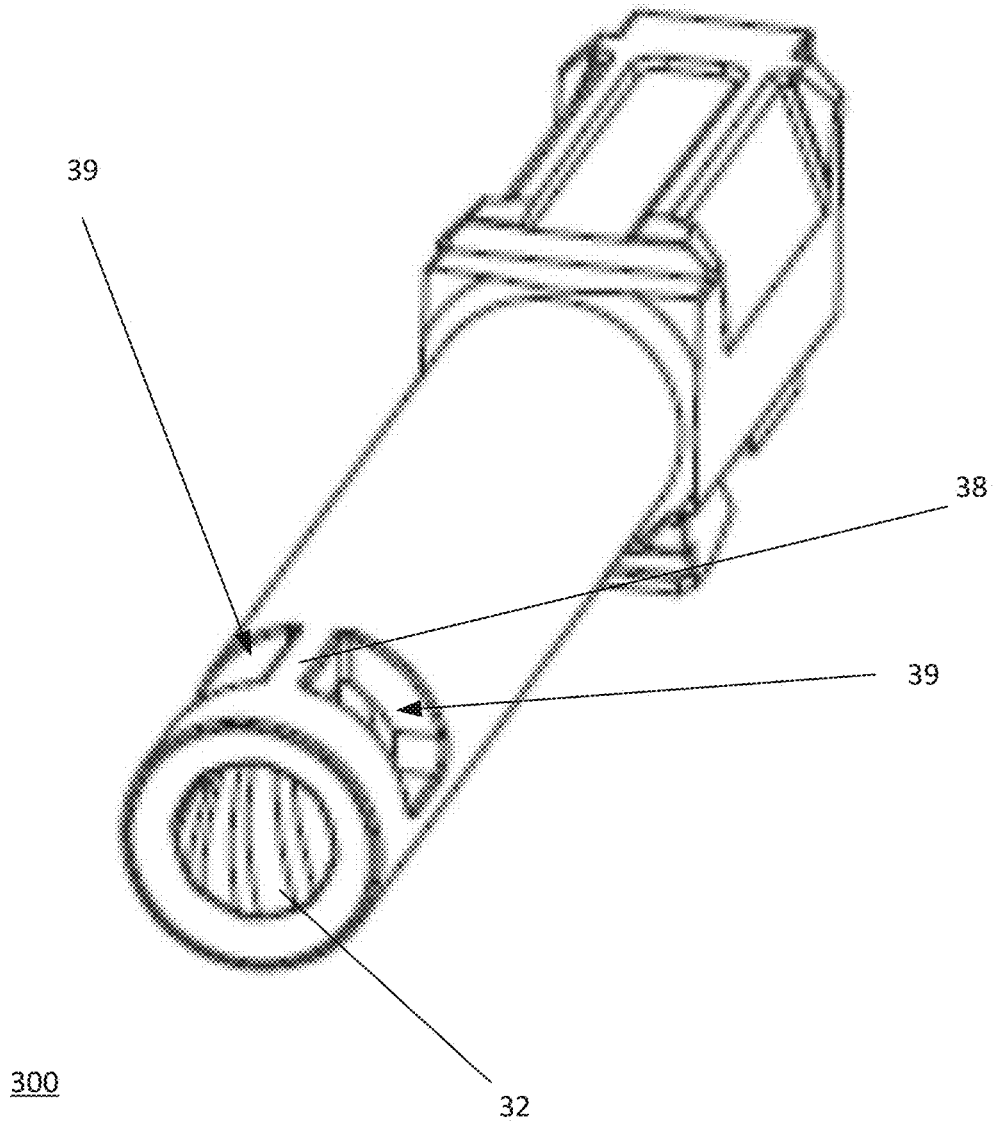


FIG. 3

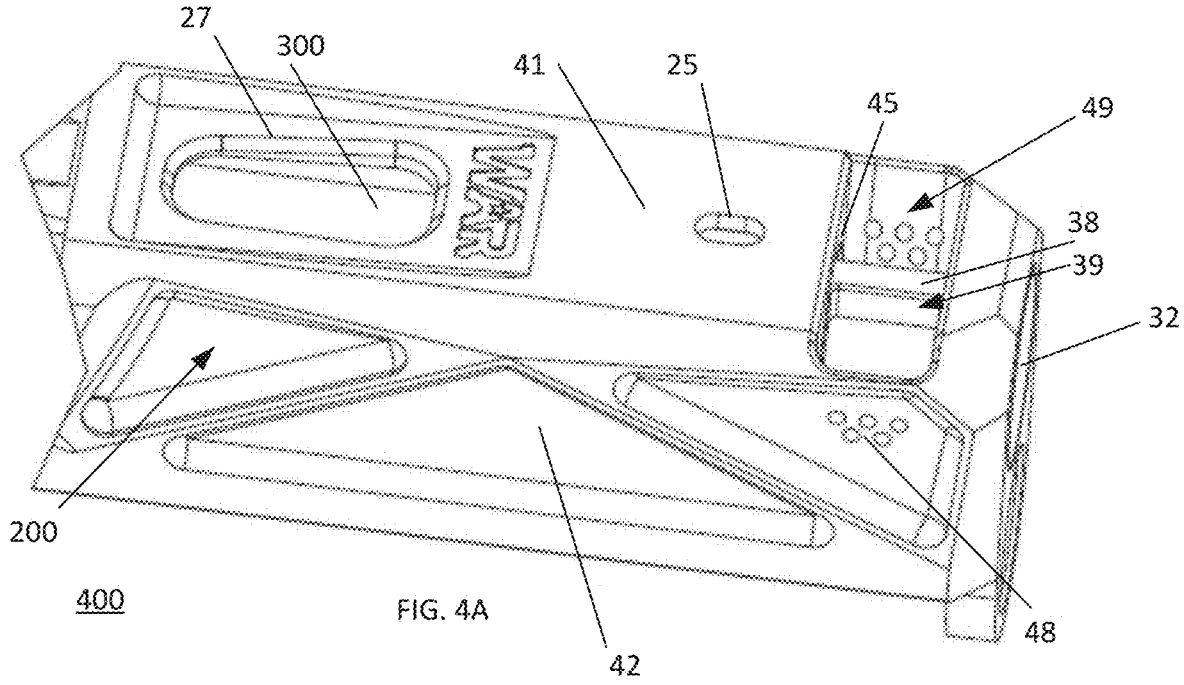


FIG. 4A

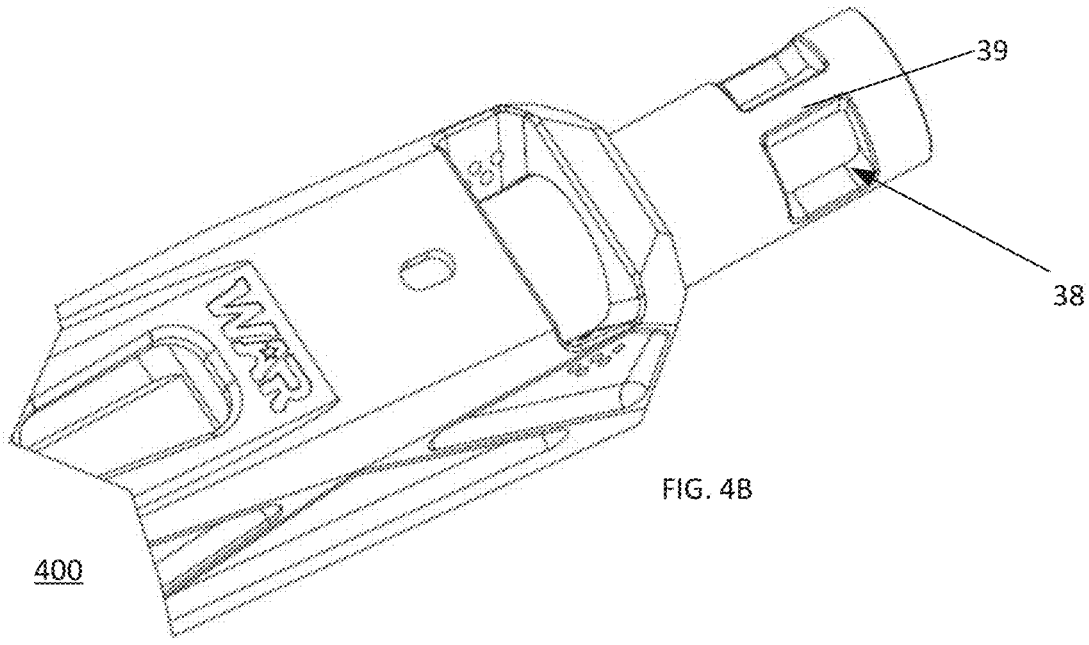


FIG. 4B

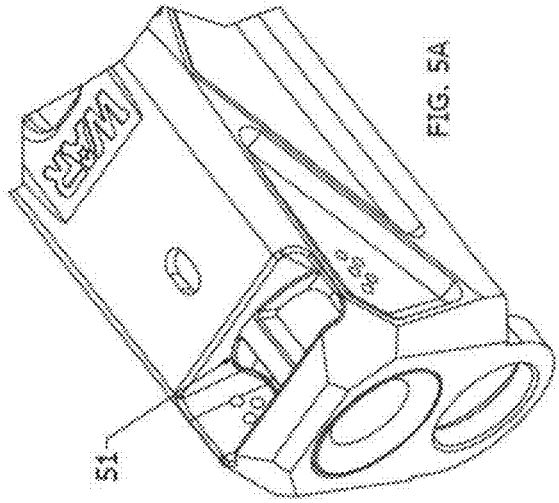


FIG. 5A

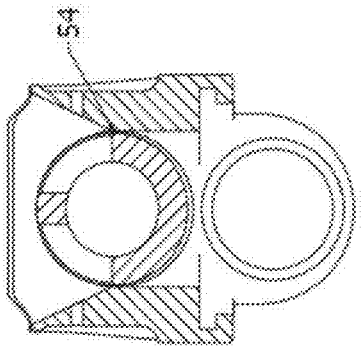


FIG. 5C

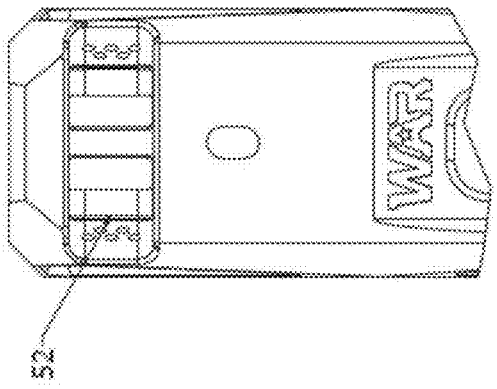


FIG. 5B

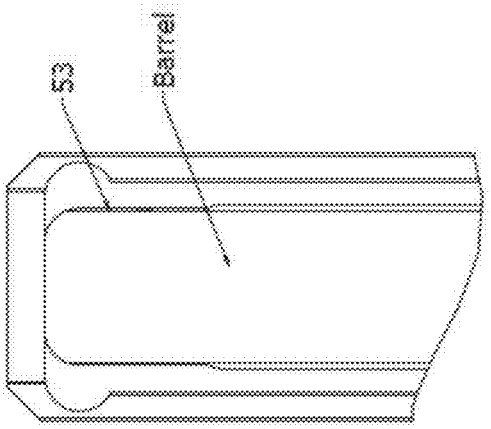


FIG. 5D

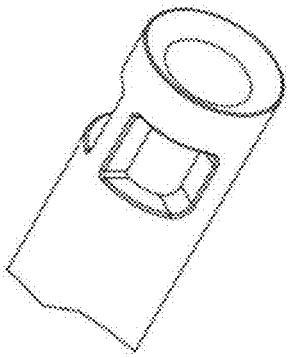


FIG. 5E

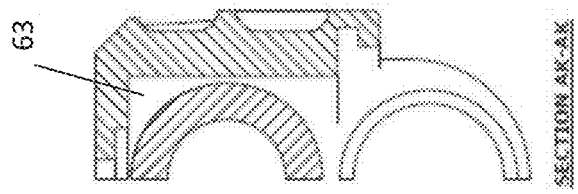


FIG. 6E

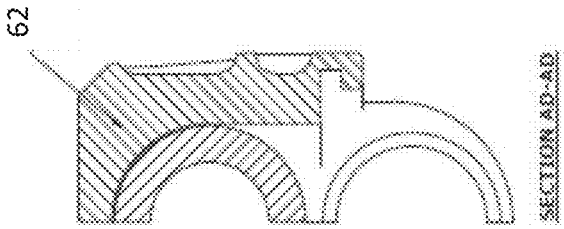


FIG. 6D

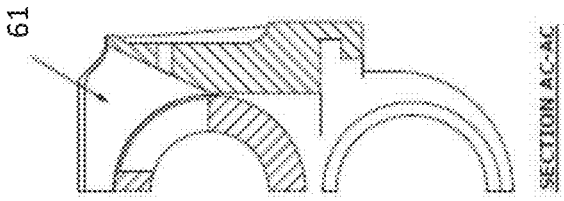


FIG. 6C

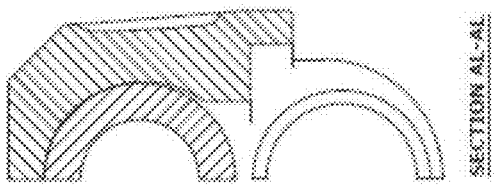


FIG. 6B

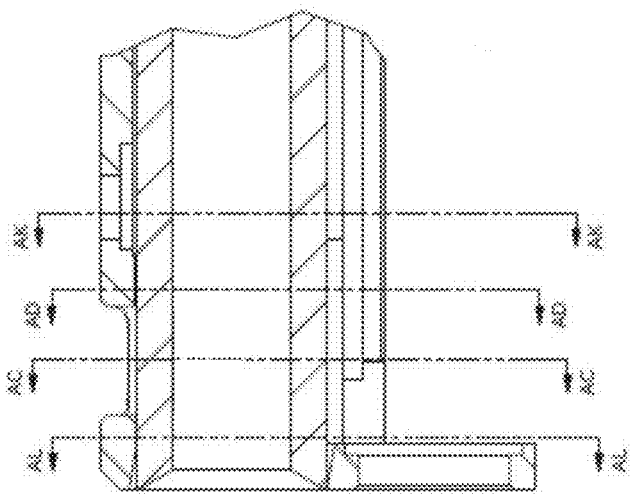


FIG. 6A

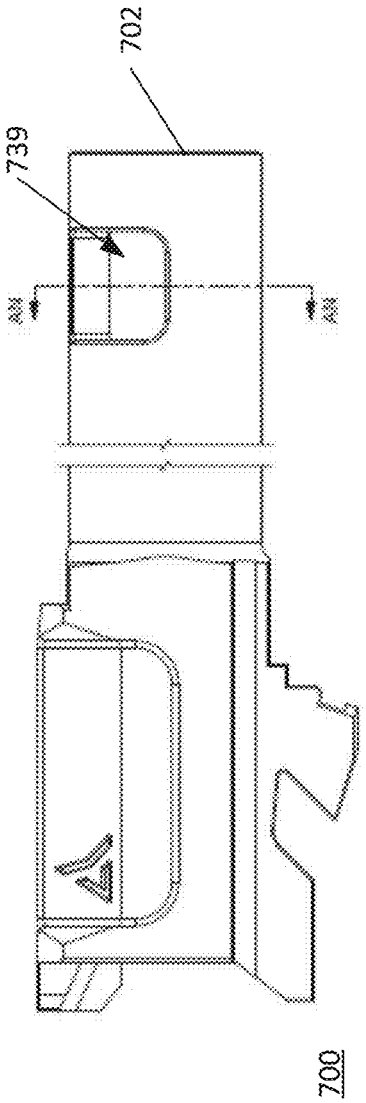


FIG. 7A

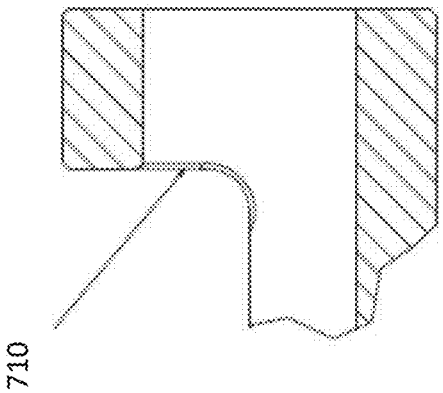


FIG. 7D

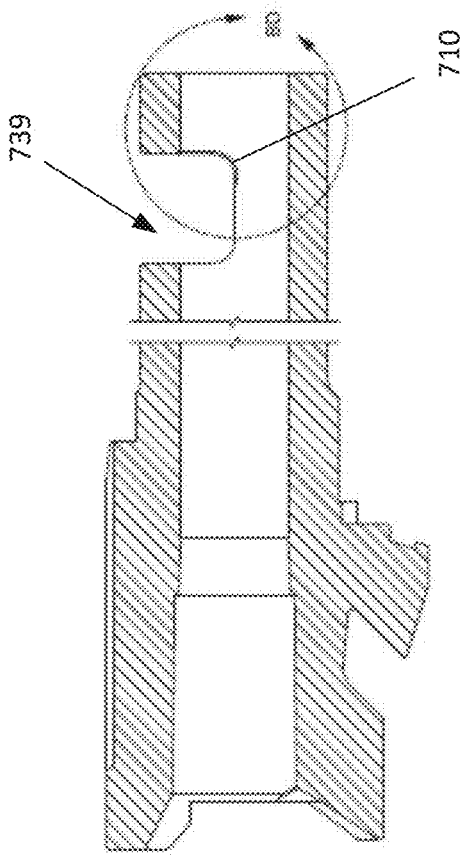


FIG. 7C

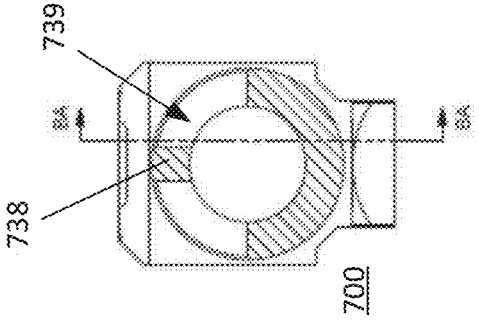


FIG. 7B

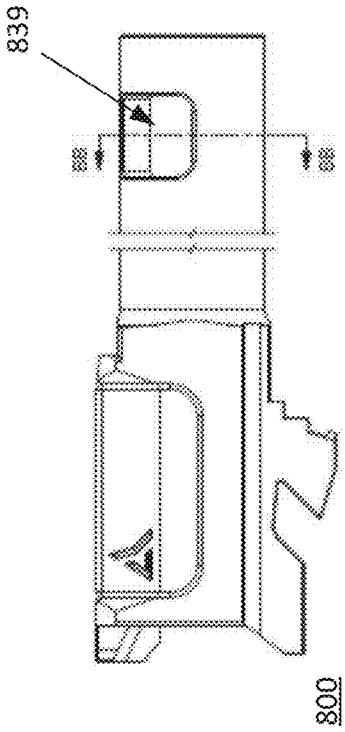


FIG. 8A

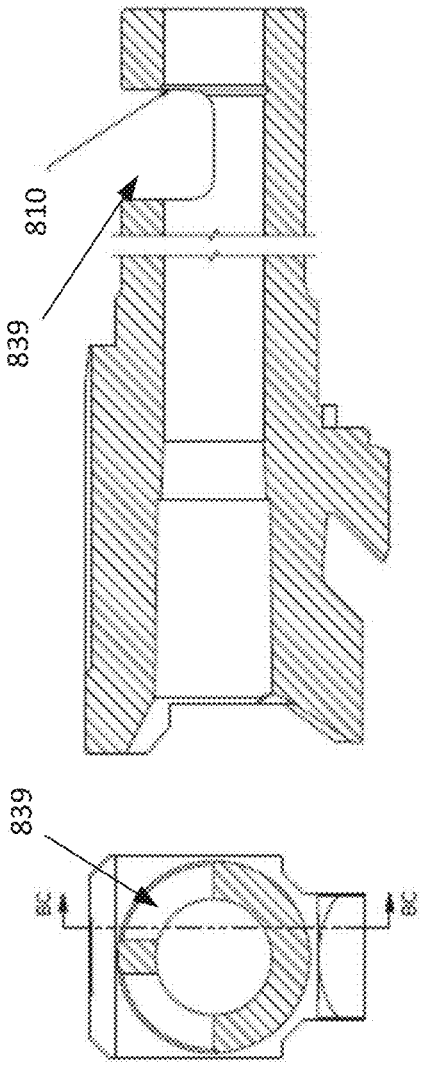


FIG. 8C

FIG. 8B

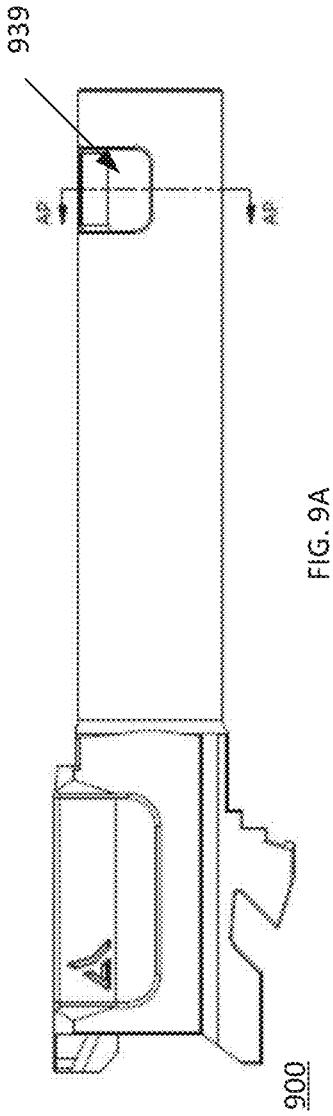


FIG. 9A

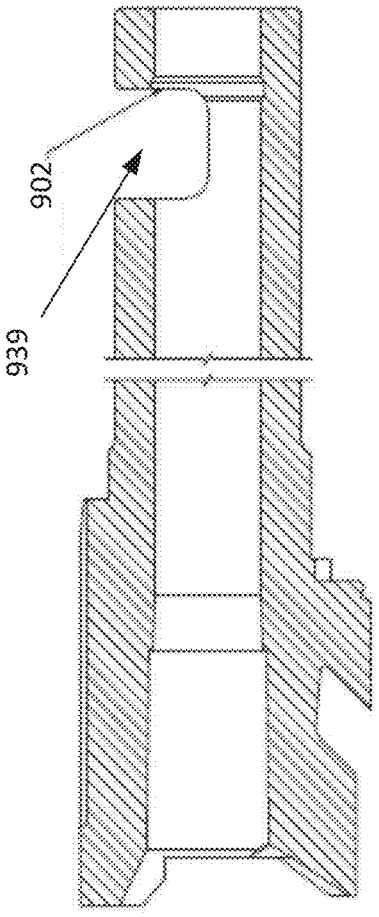


FIG. 9C

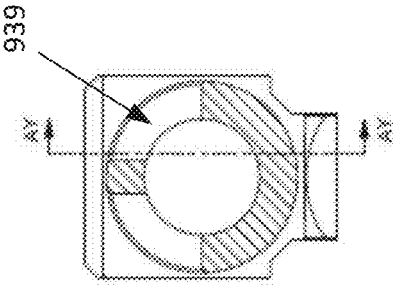


FIG. 9B

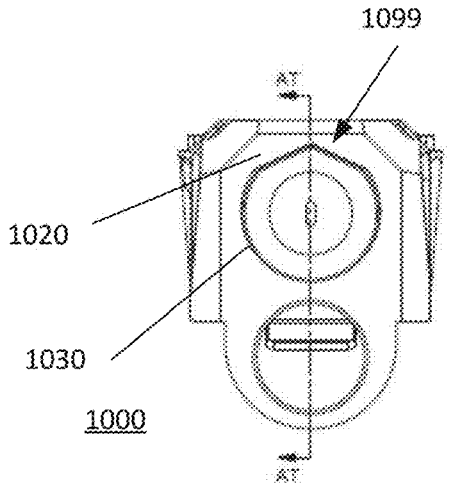


FIG. 10A

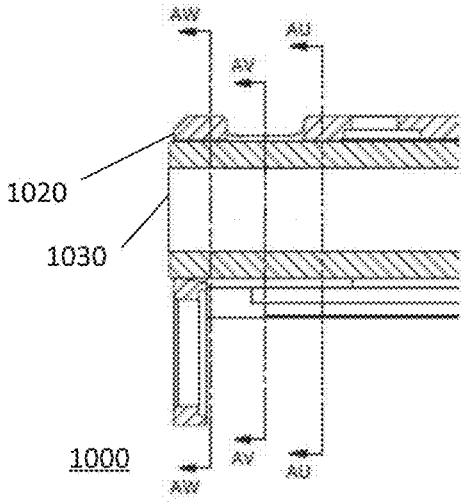


FIG. 10B

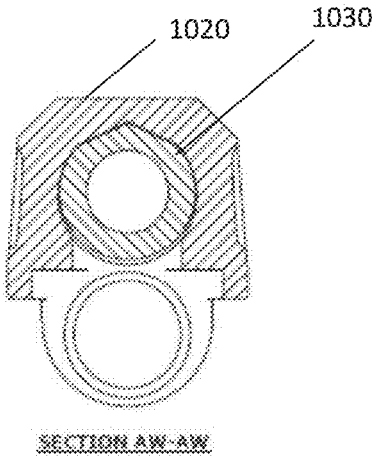


FIG. 10C

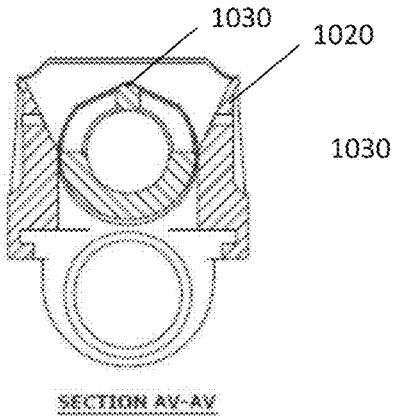


FIG. 10D

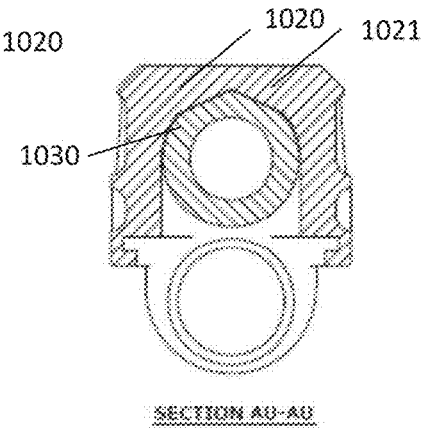


FIG. 10E

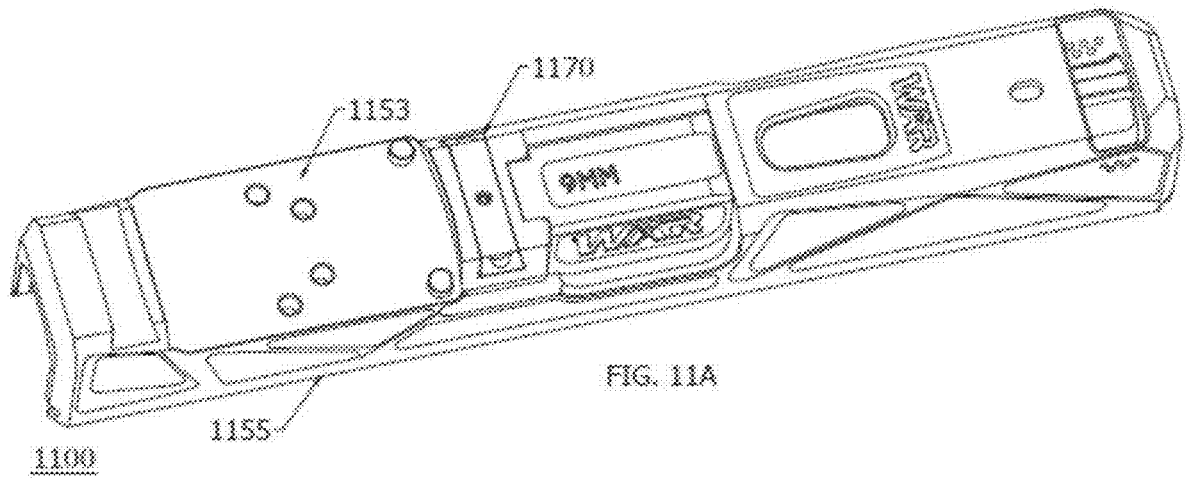


FIG. 11A

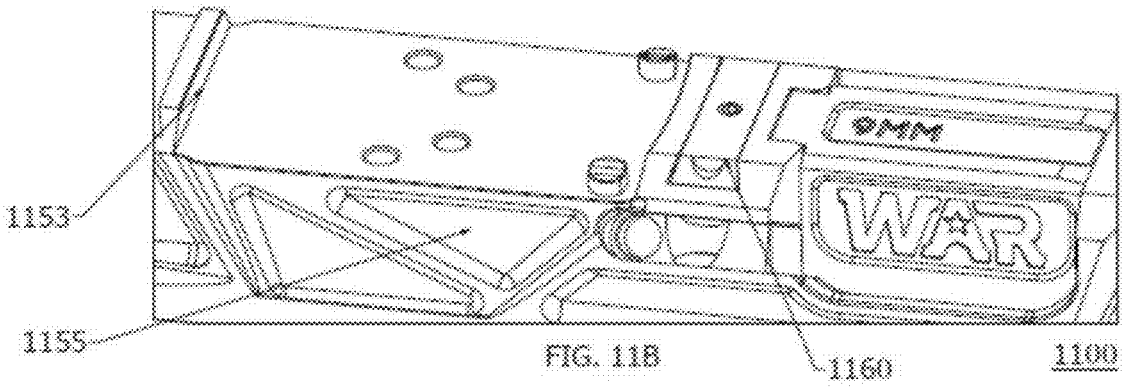
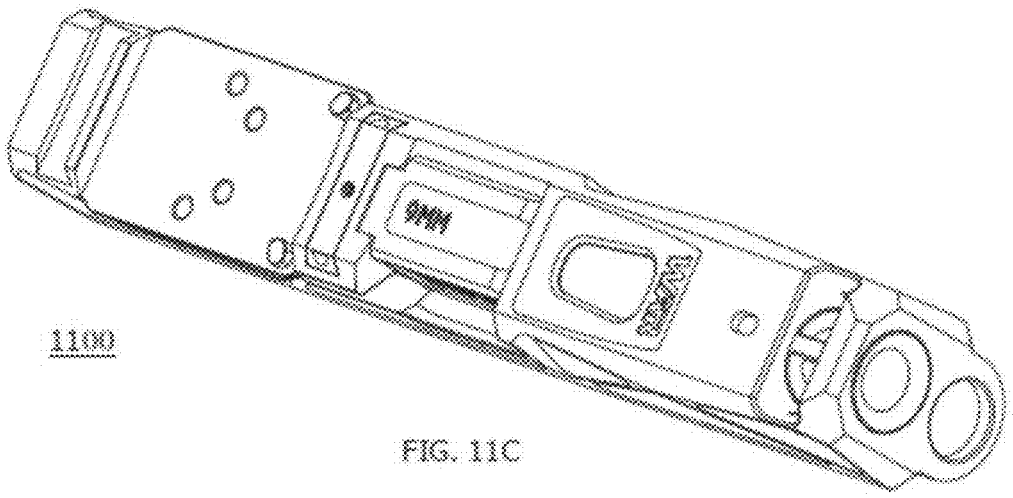


FIG. 11B



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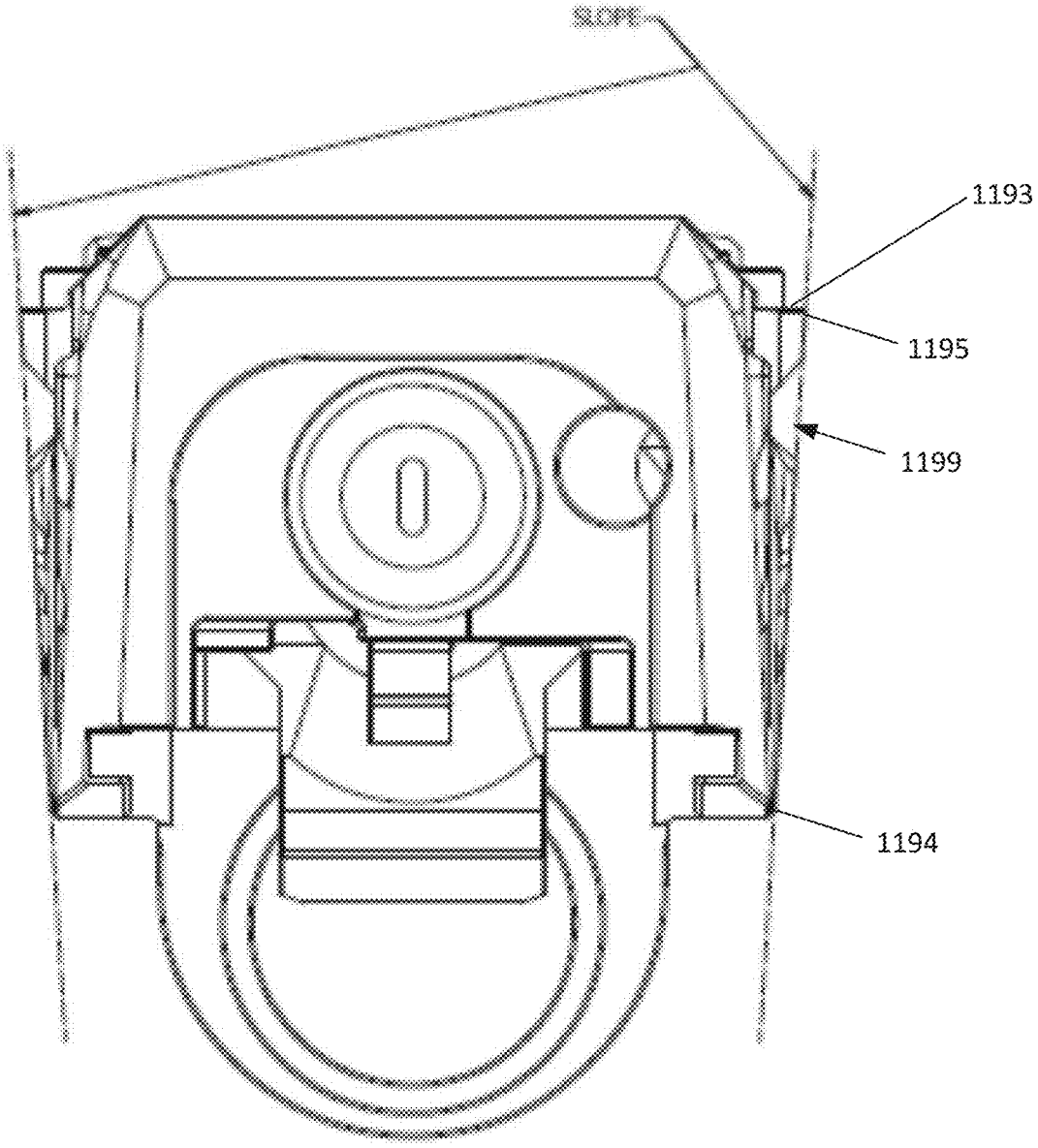


FIG. 11D

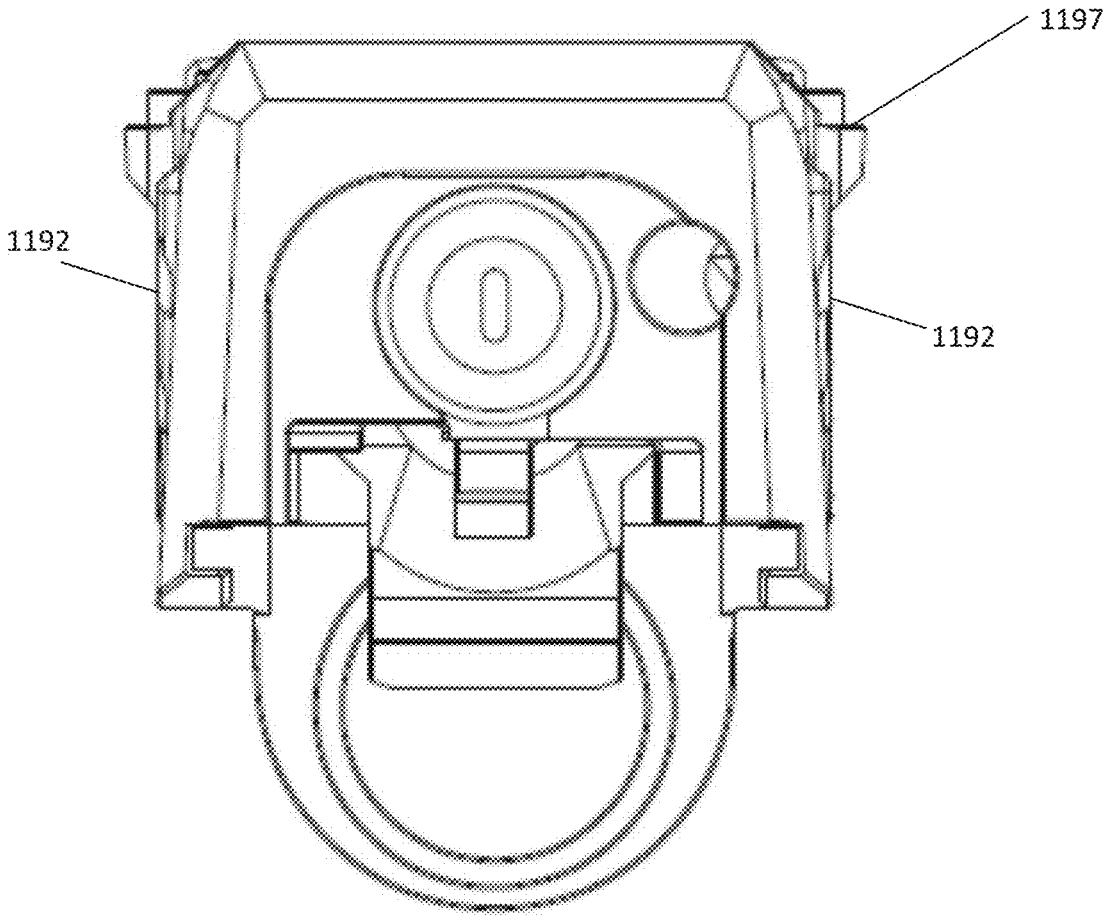


FIG. 11E

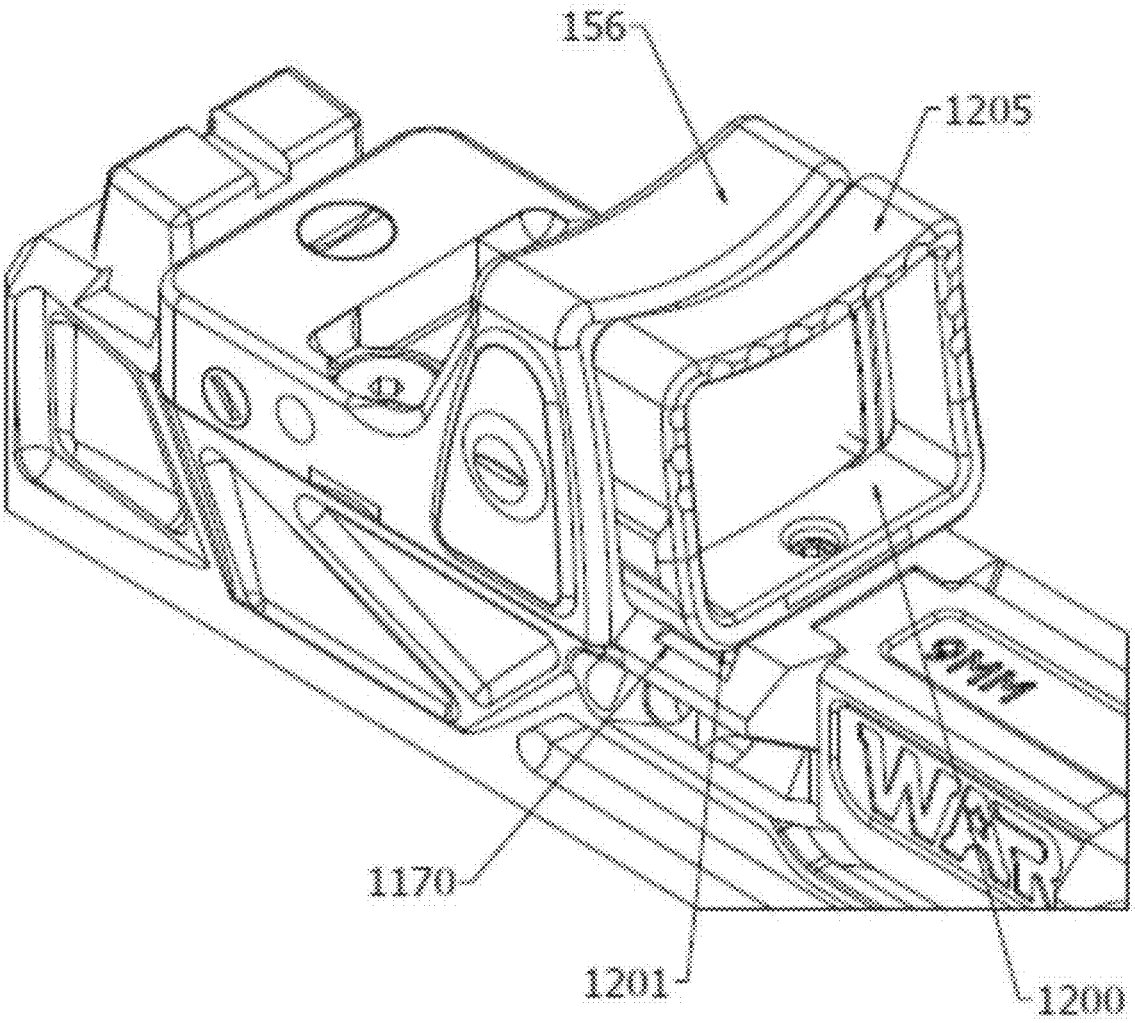


FIG. 12

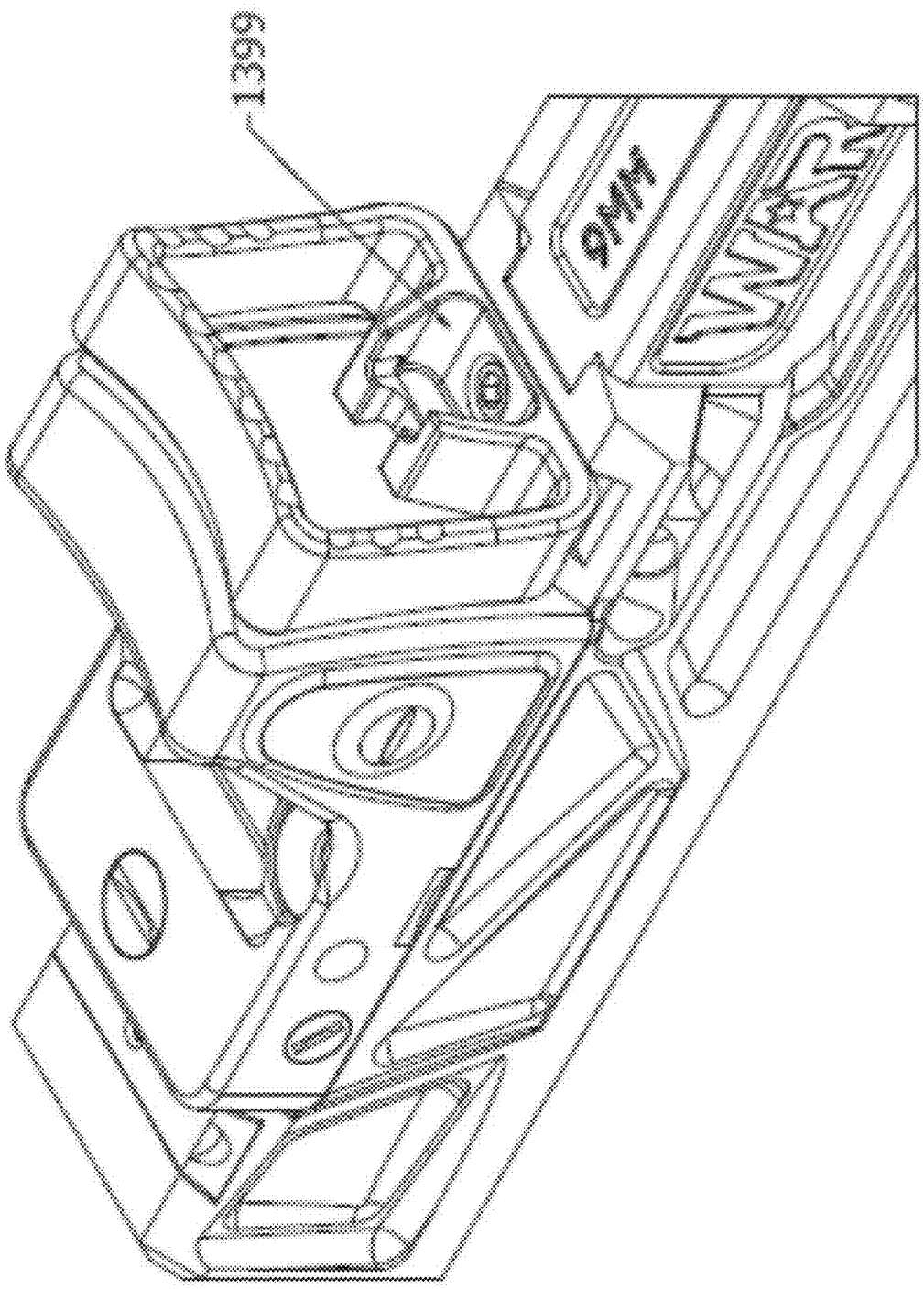


FIG. 13

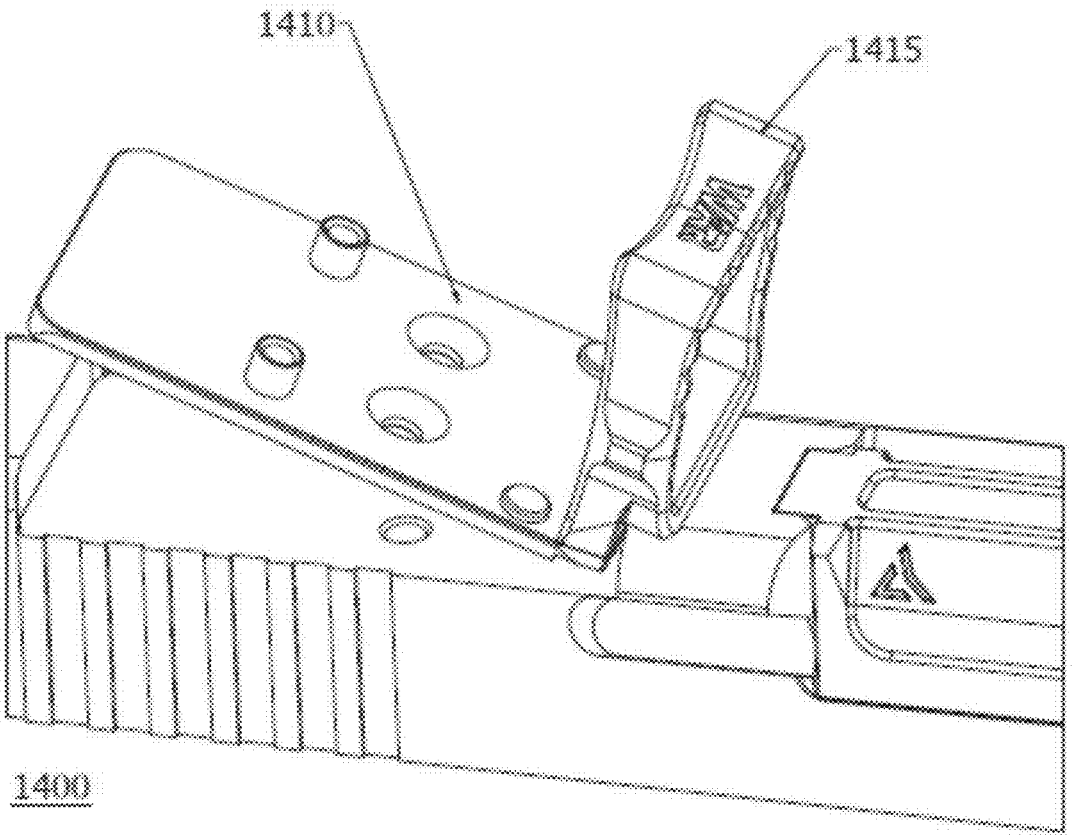


FIG. 14A

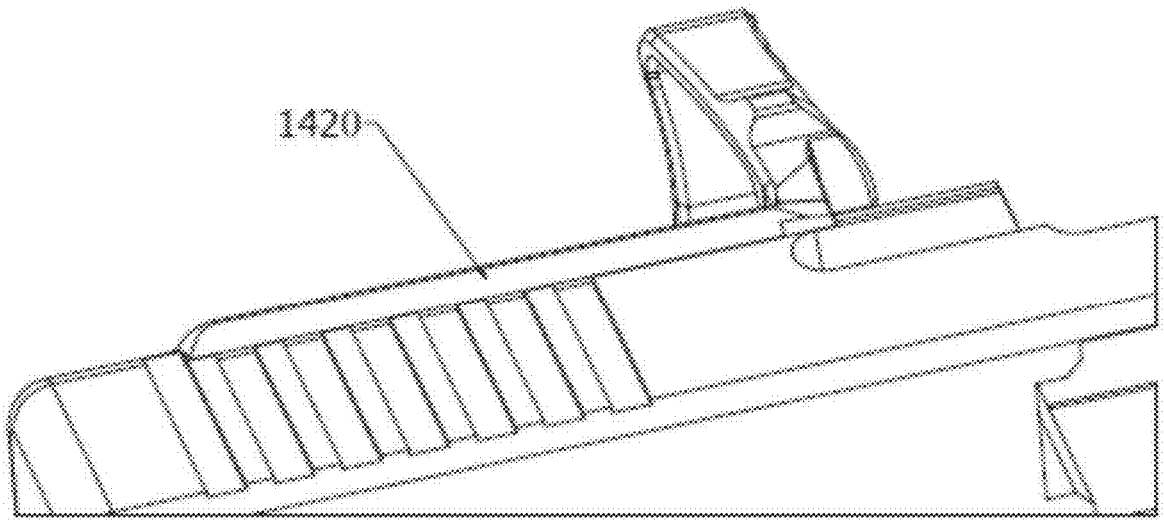


FIG. 14B

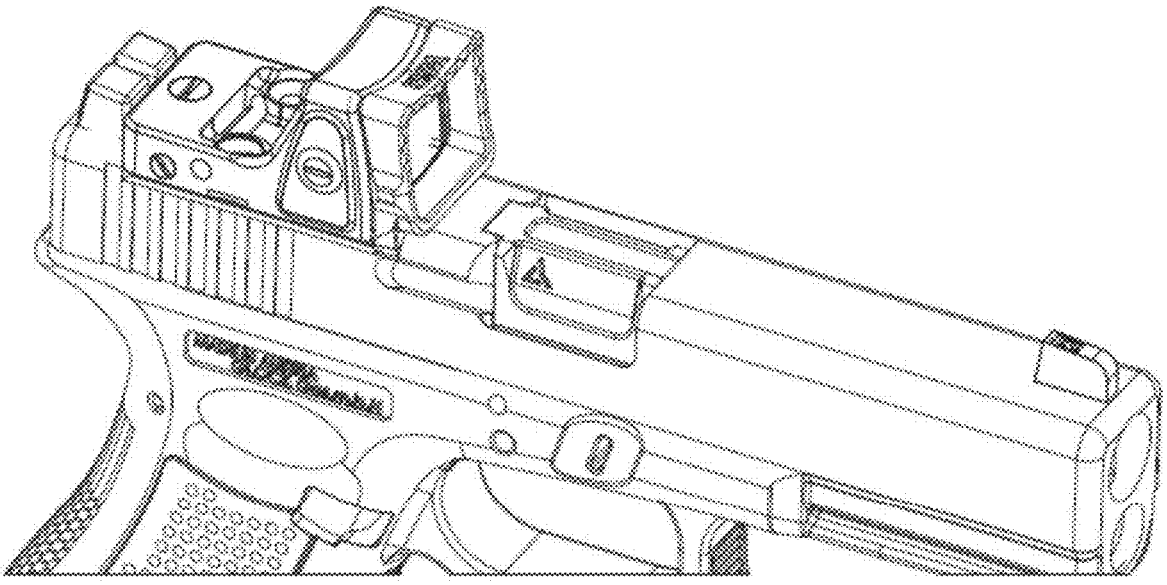


FIG. 14C

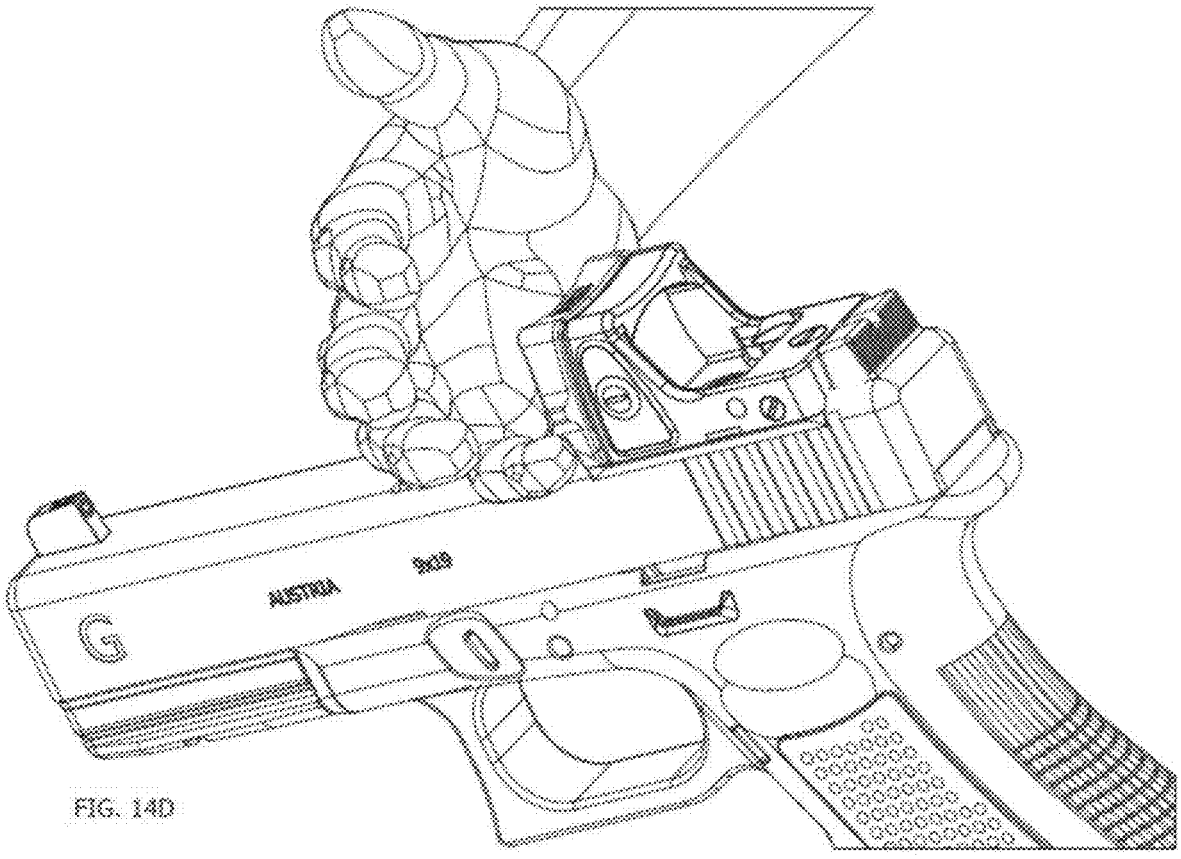


FIG. 14D

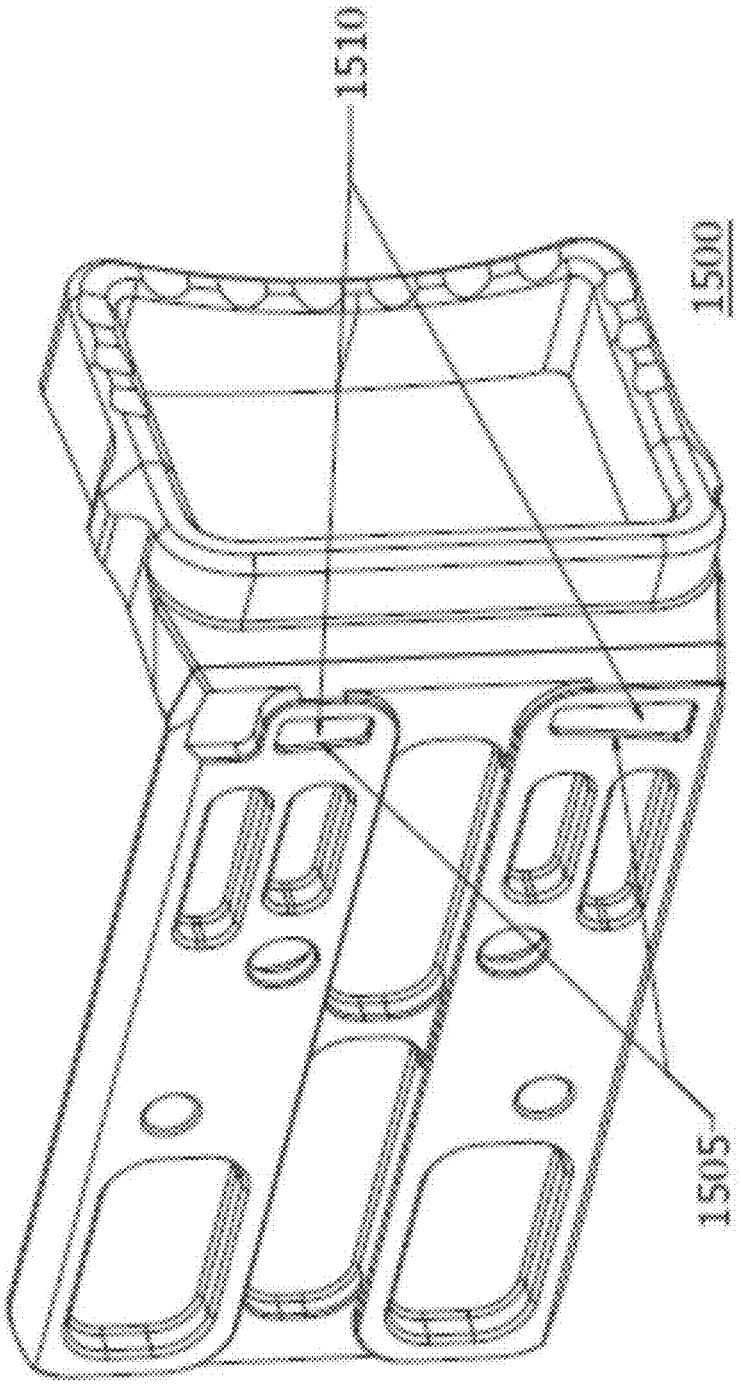


FIG. 15

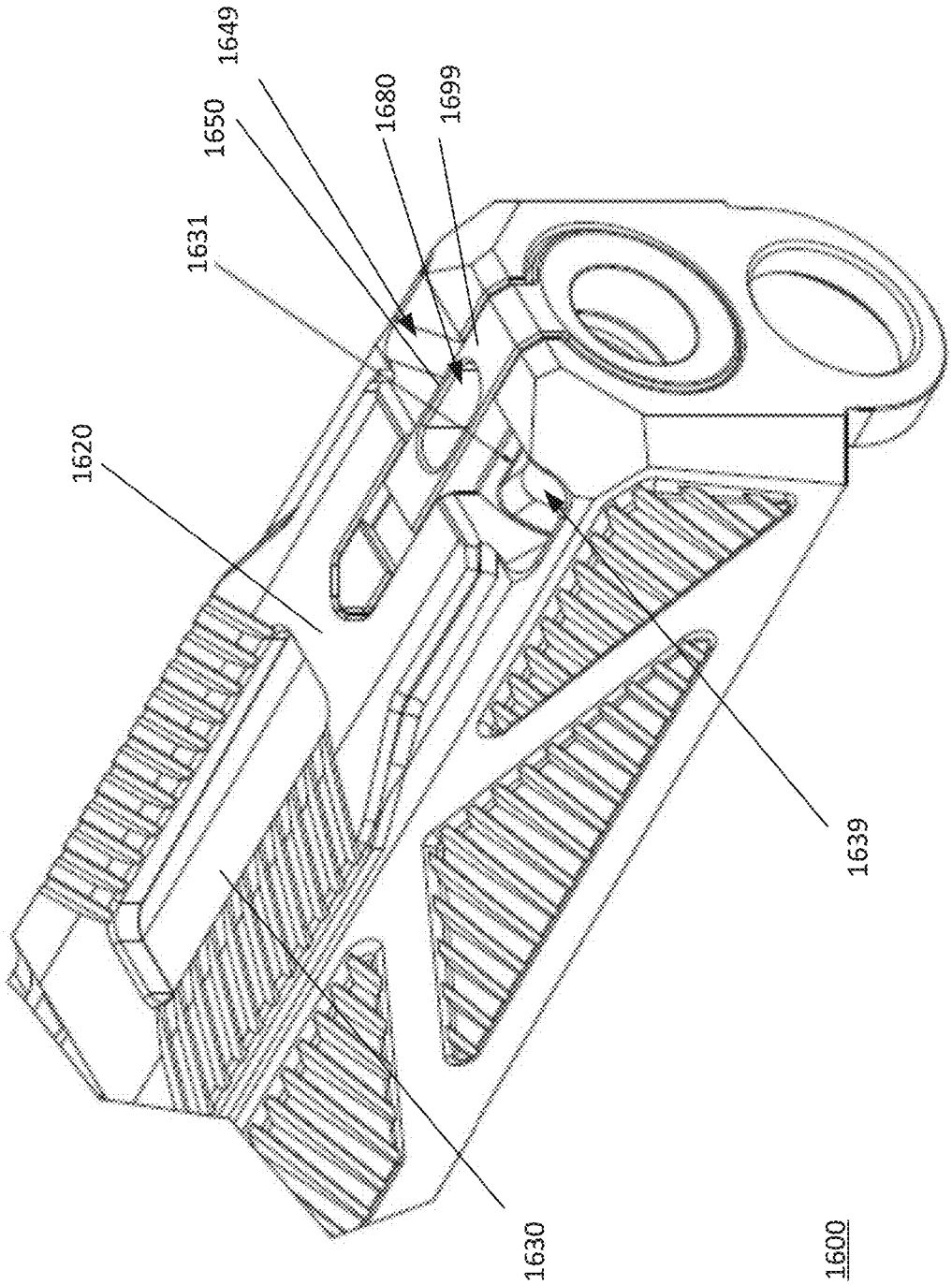


FIG. 16A

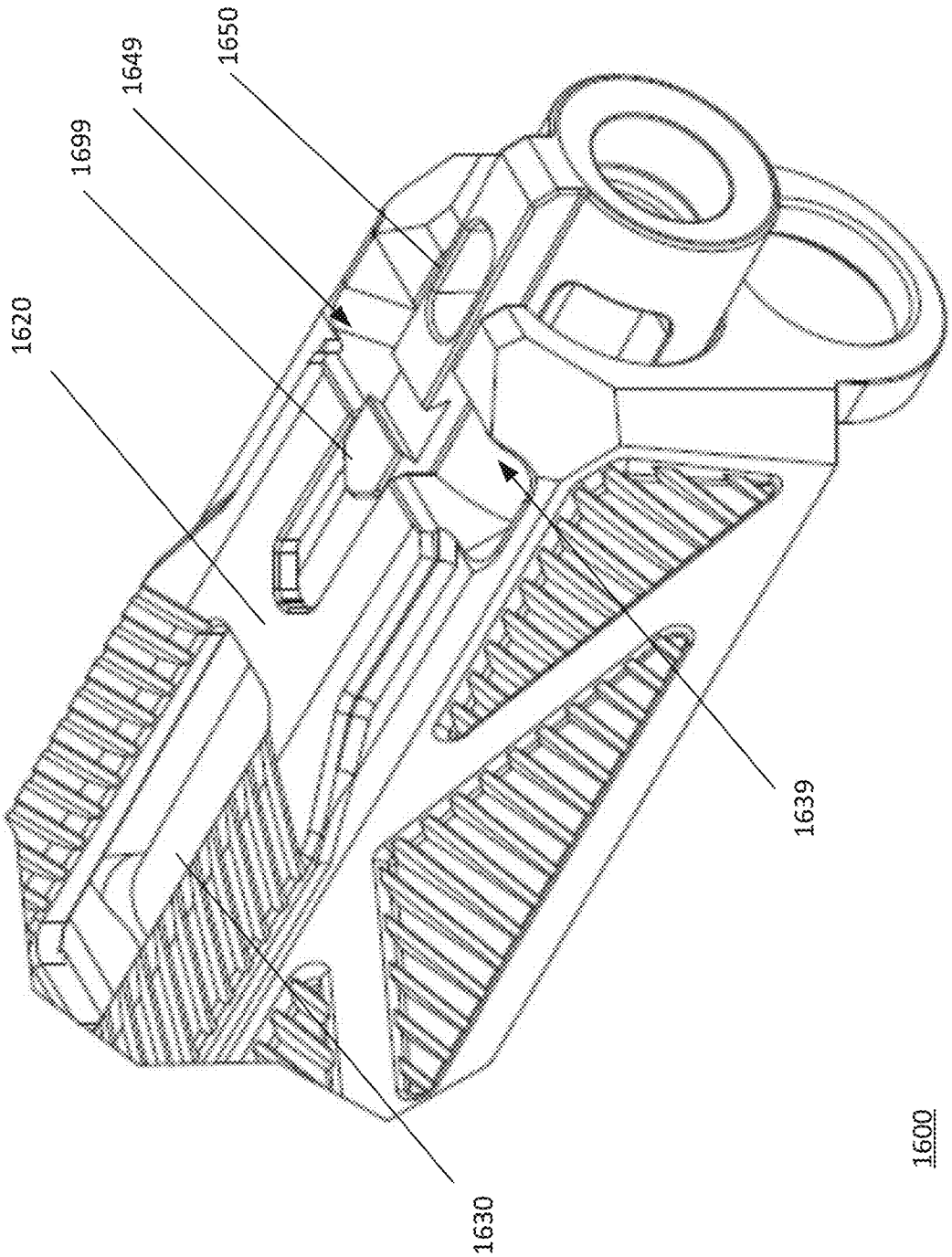


FIG. 16B

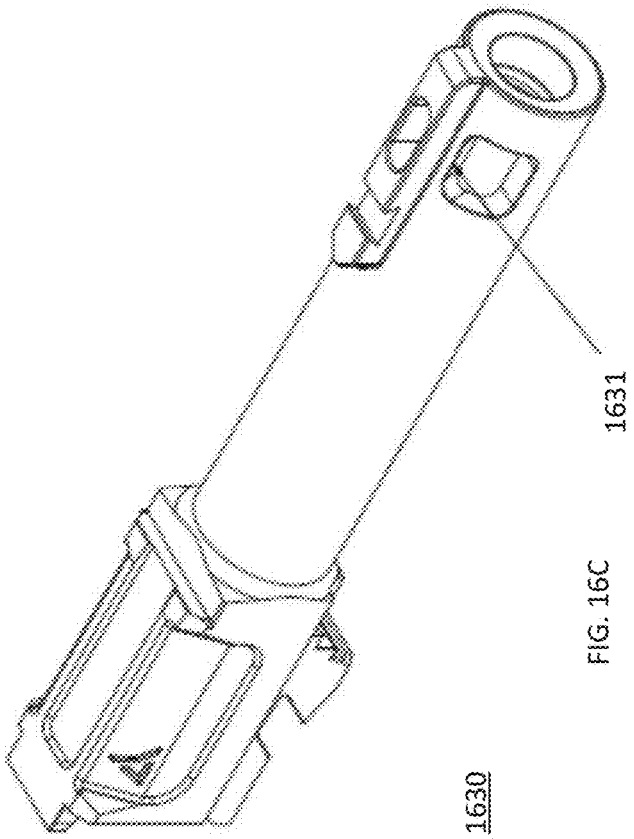


FIG. 16C

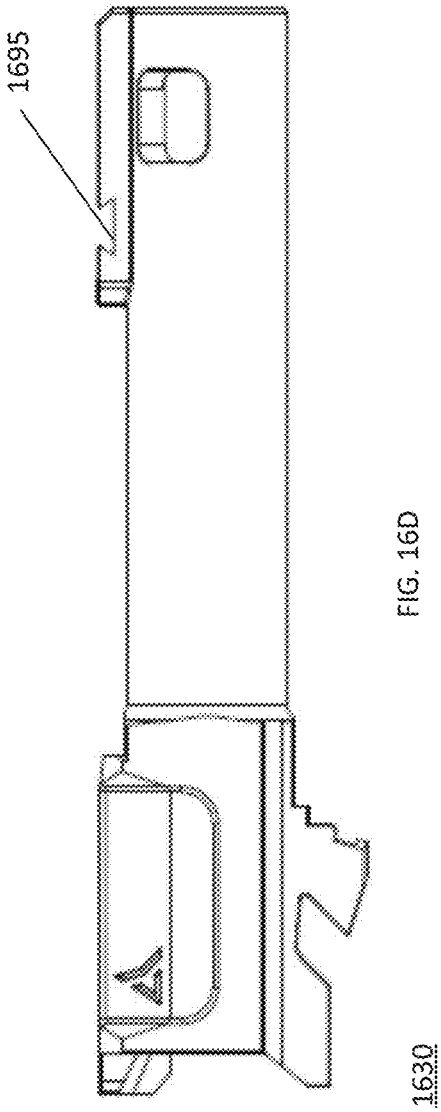


FIG. 16D

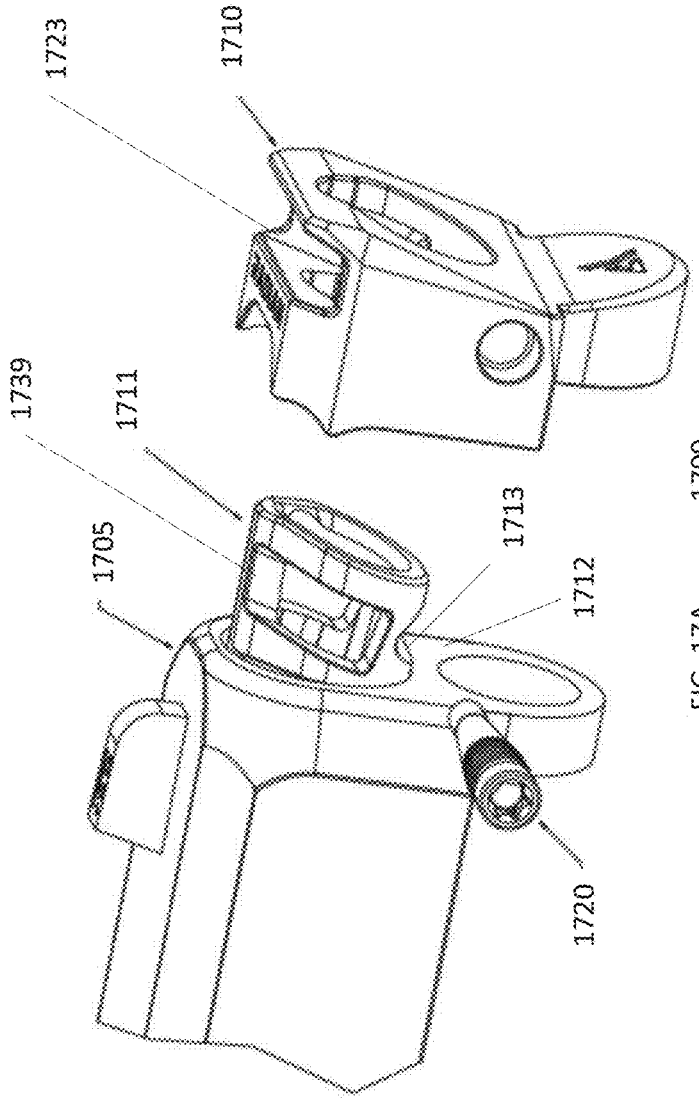


FIG. 17A 1700

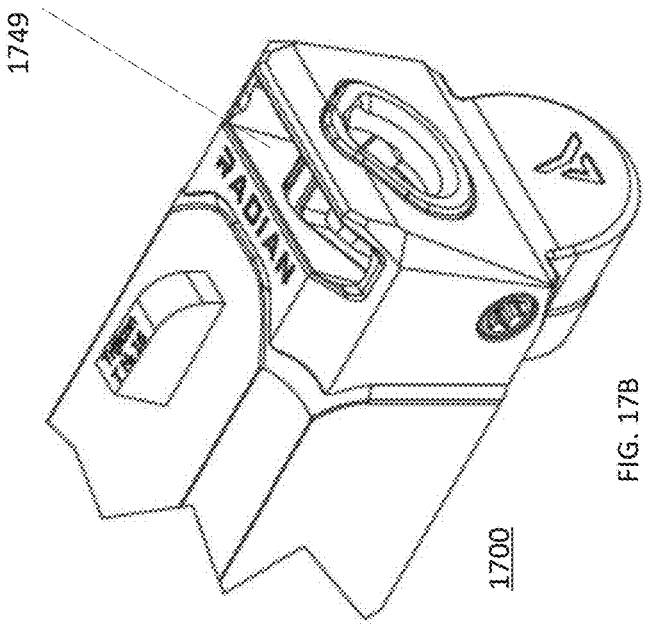


FIG. 17B

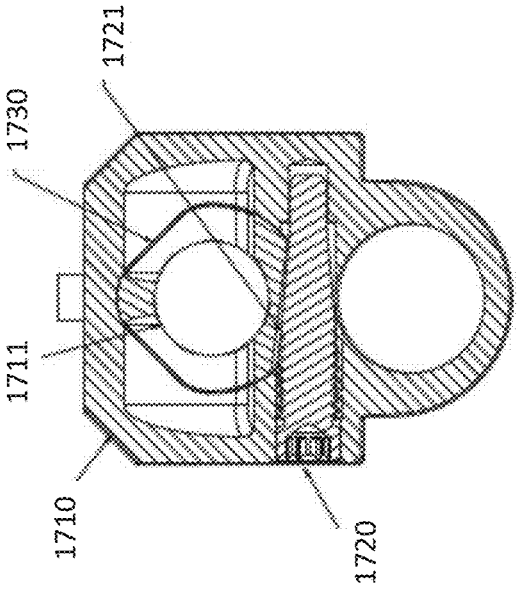


FIG. 17F

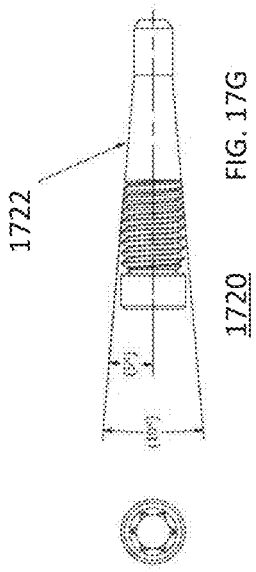


FIG. 17G

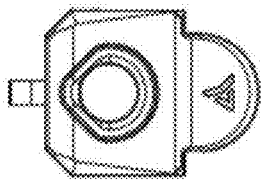


FIG. 17E

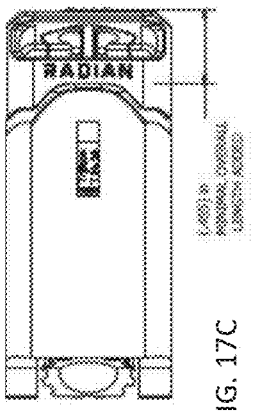


FIG. 17C

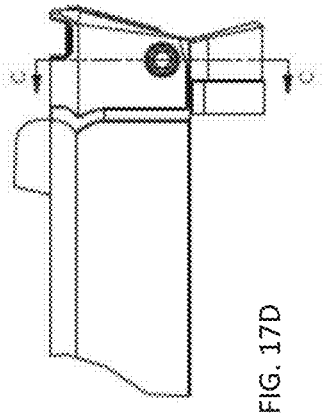


FIG. 17D

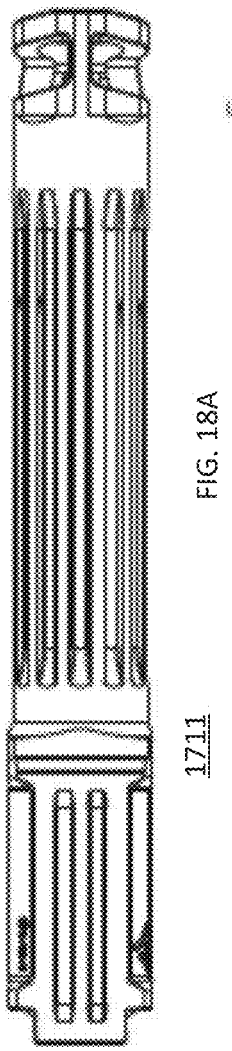


FIG. 18A

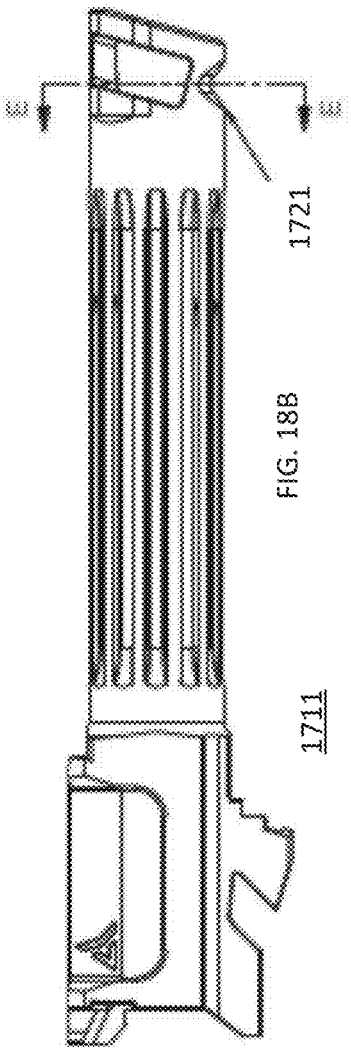


FIG. 18B

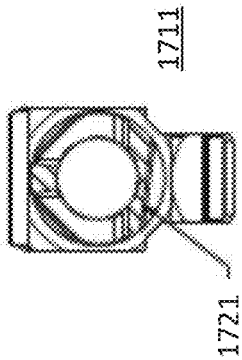


FIG. 18C

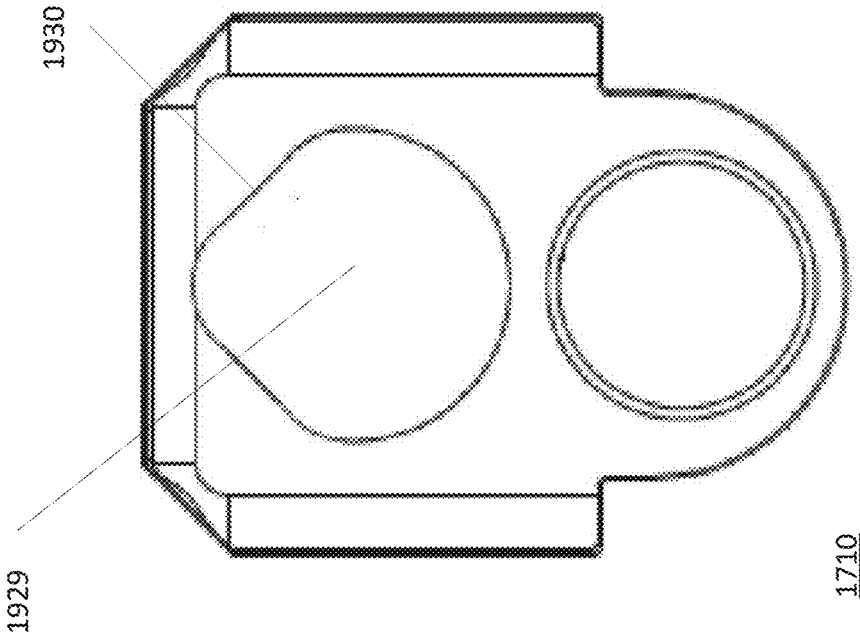


FIG. 19

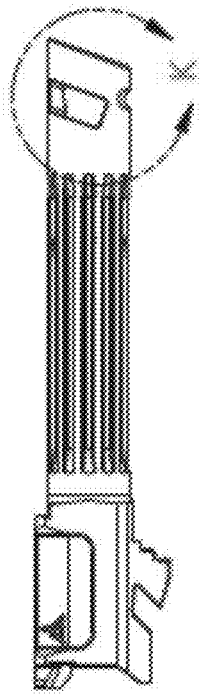


FIG. 20A

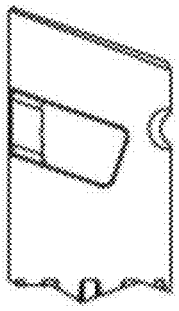


FIG. 20B

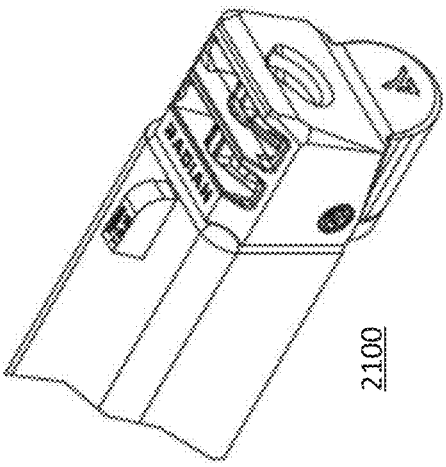


FIG. 21B

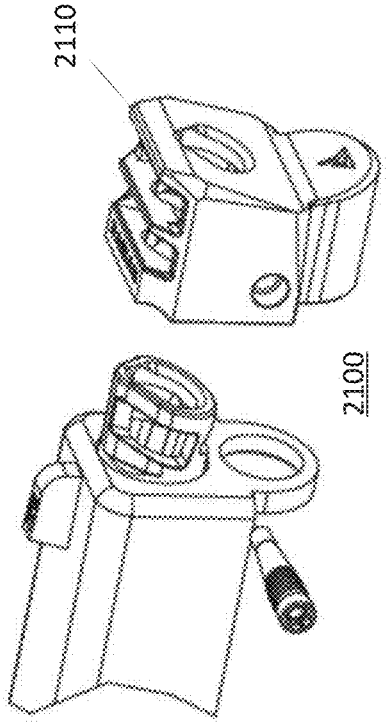
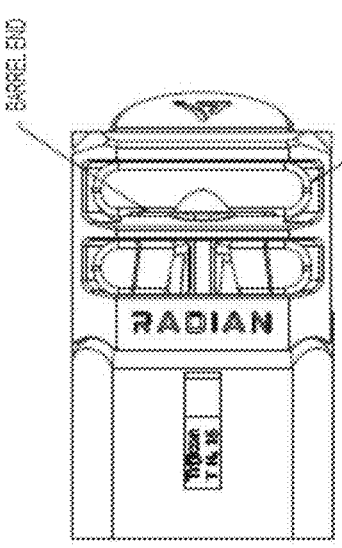


FIG. 21A



View H-H

FIG. 21E

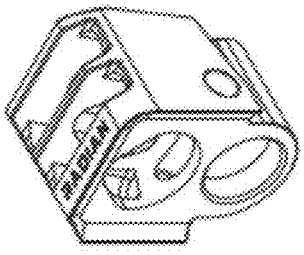


FIG. 21F

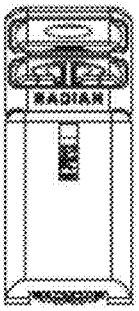


FIG. 21C

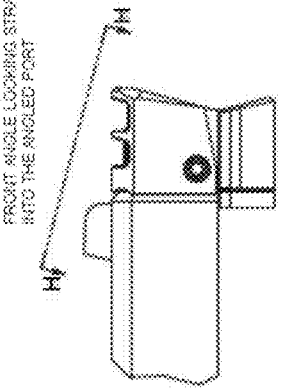


FIG. 21D

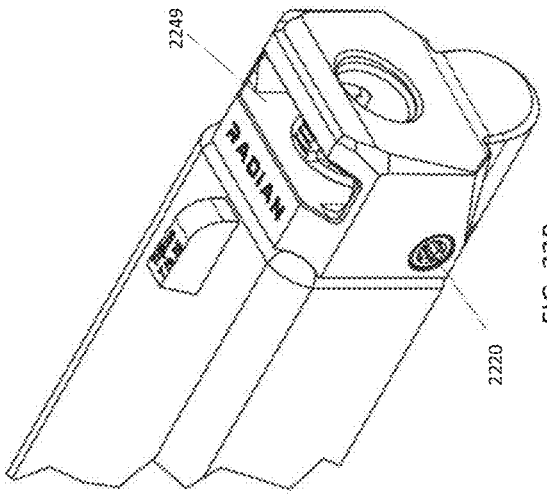


FIG. 22B

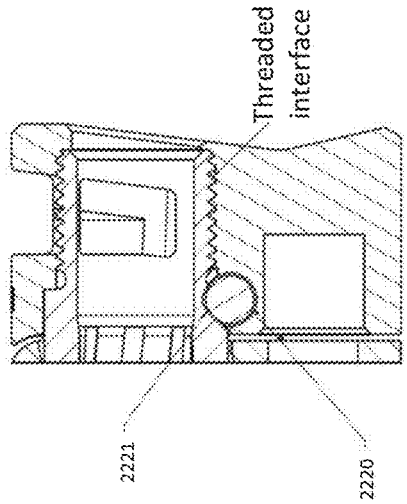


FIG. 22E

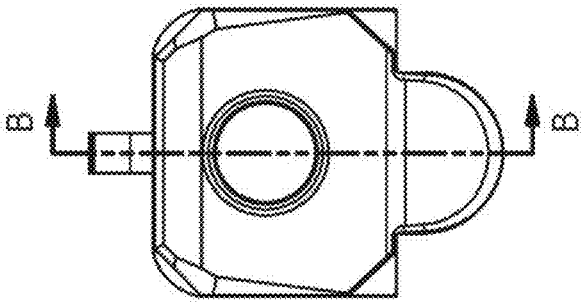


FIG. 22D

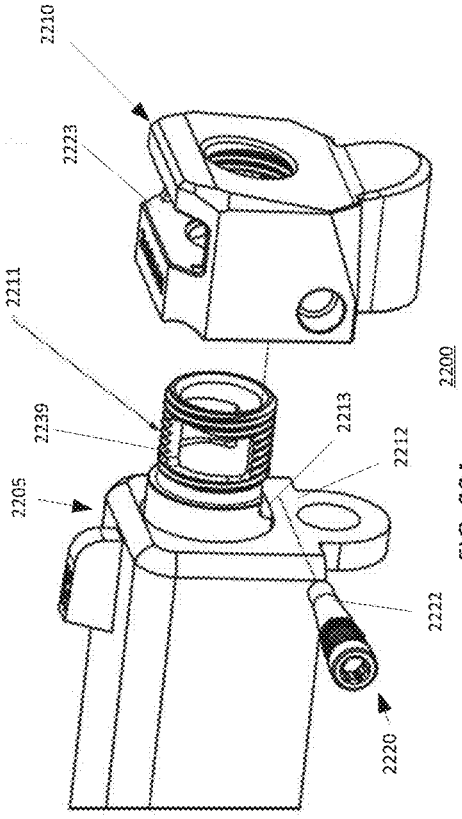


FIG. 22A

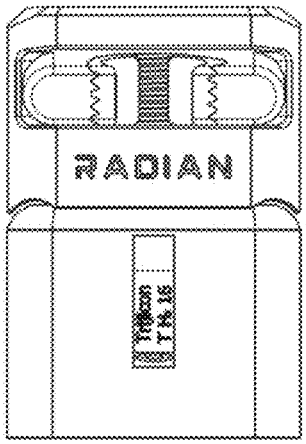


FIG. 22C

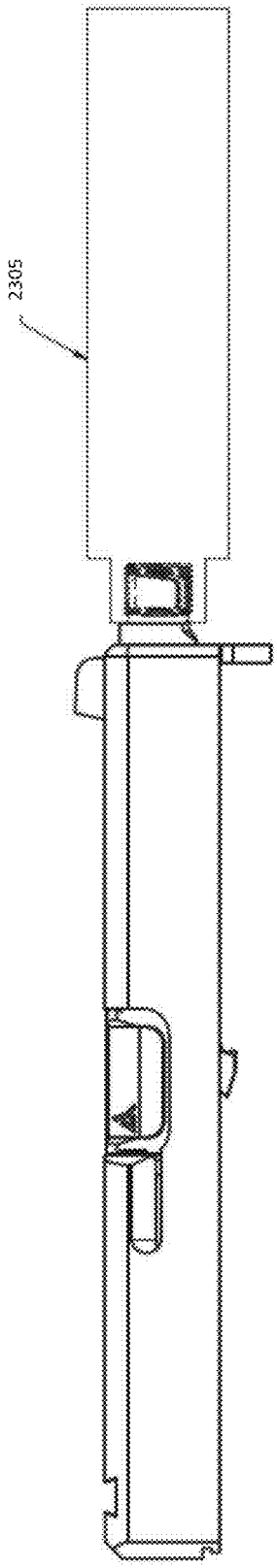


FIG. 23

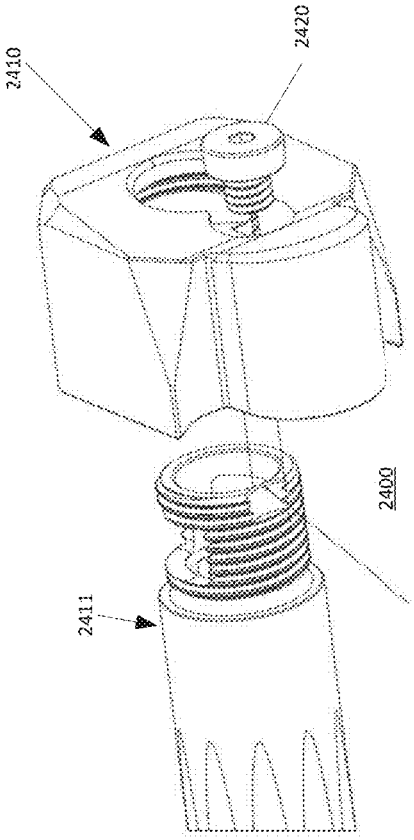


FIG. 24A

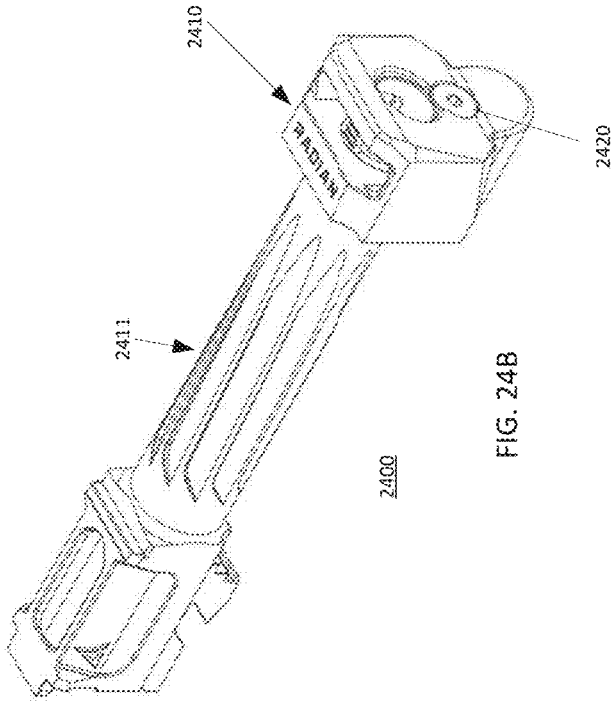


FIG. 24B

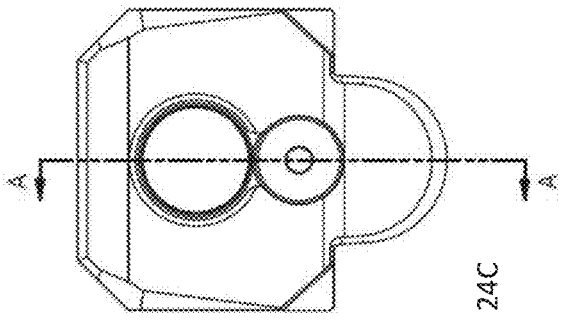


FIG. 24C

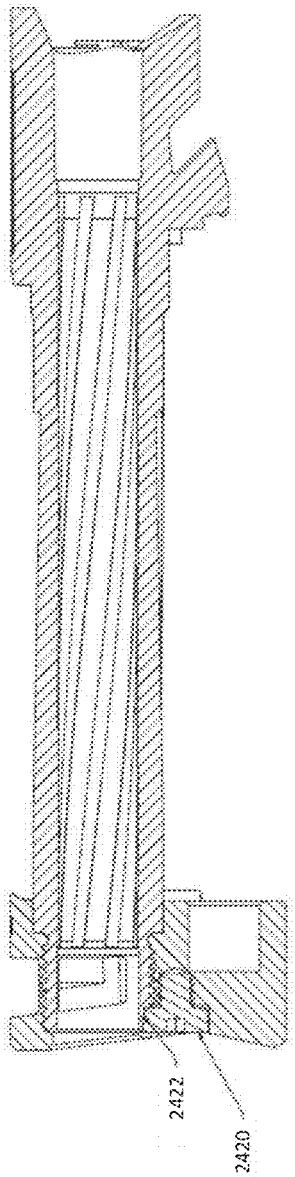


FIG. 24D

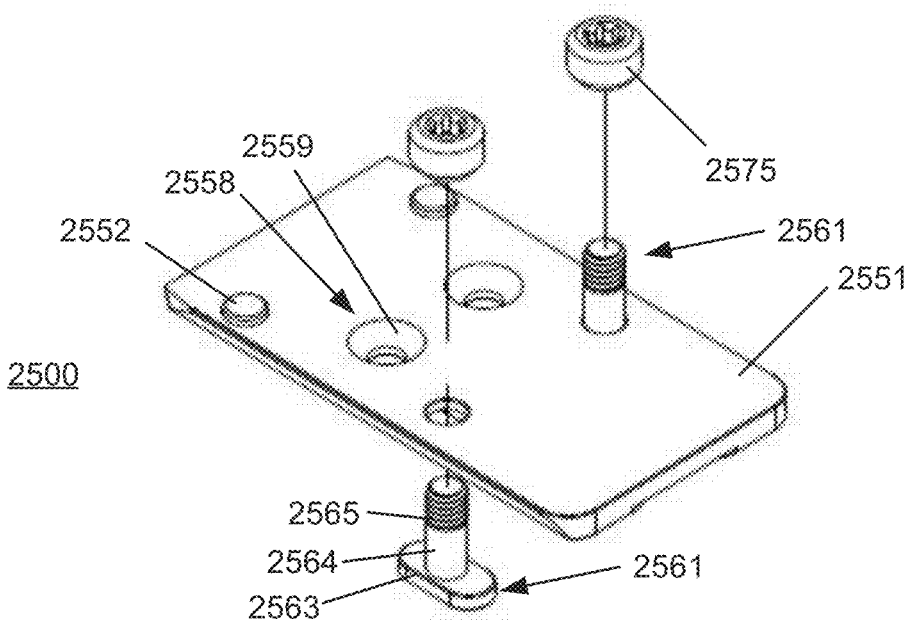


FIG. 25A

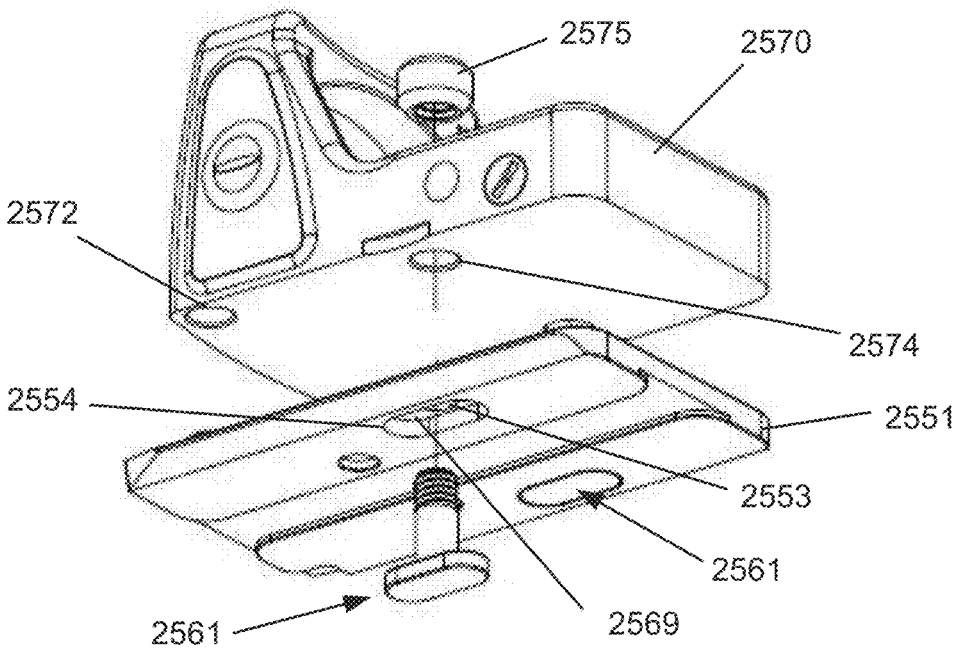


FIG. 25B

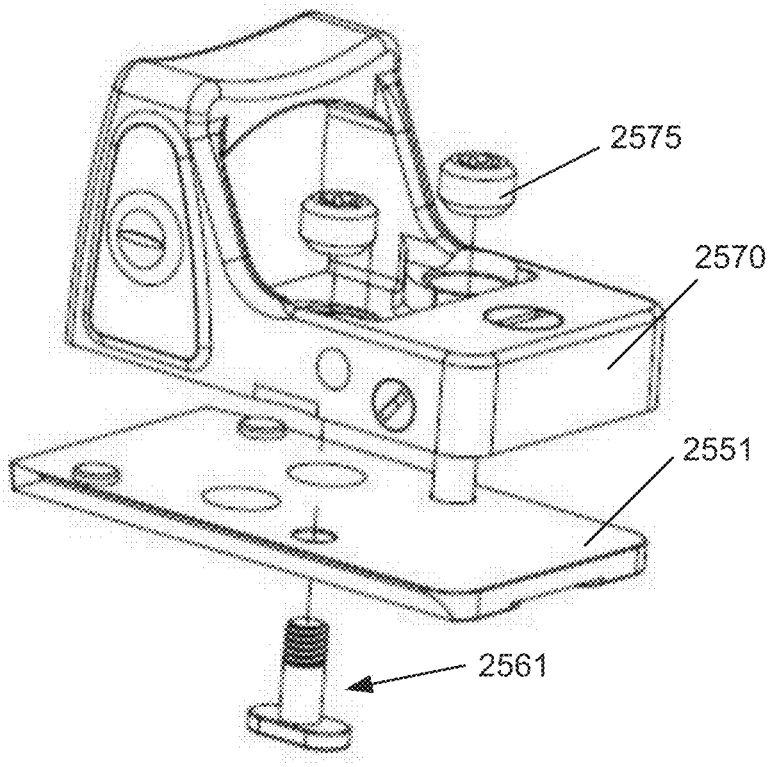


FIG. 25C

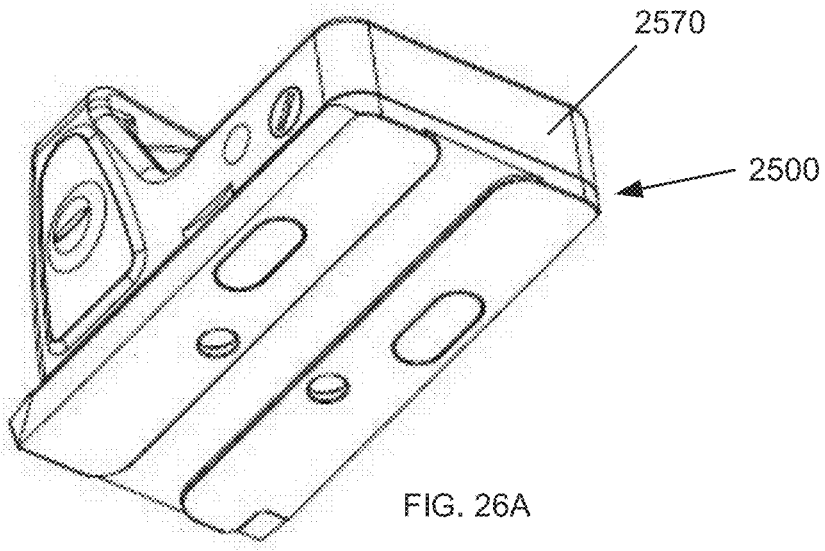


FIG. 26A

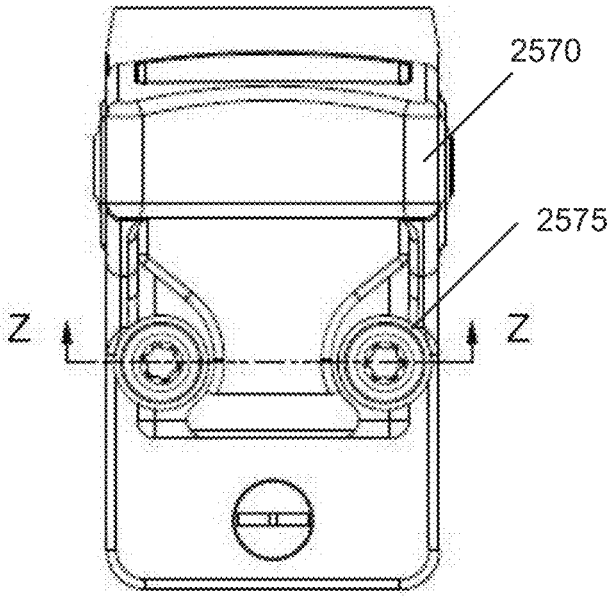


FIG. 26B

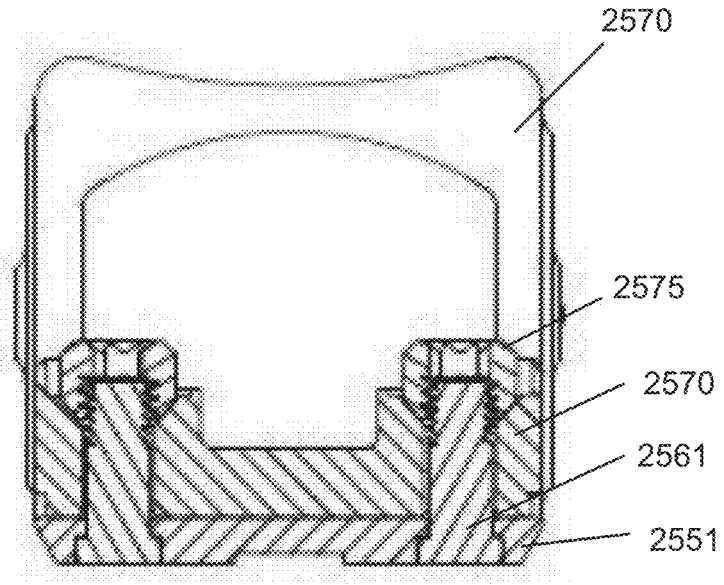


FIG. 26C

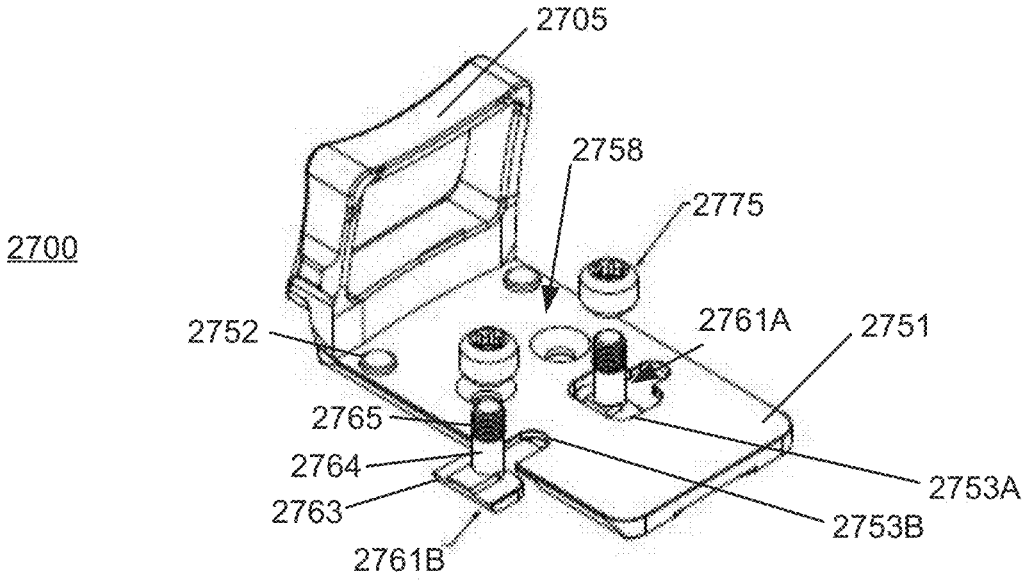


FIG. 27A

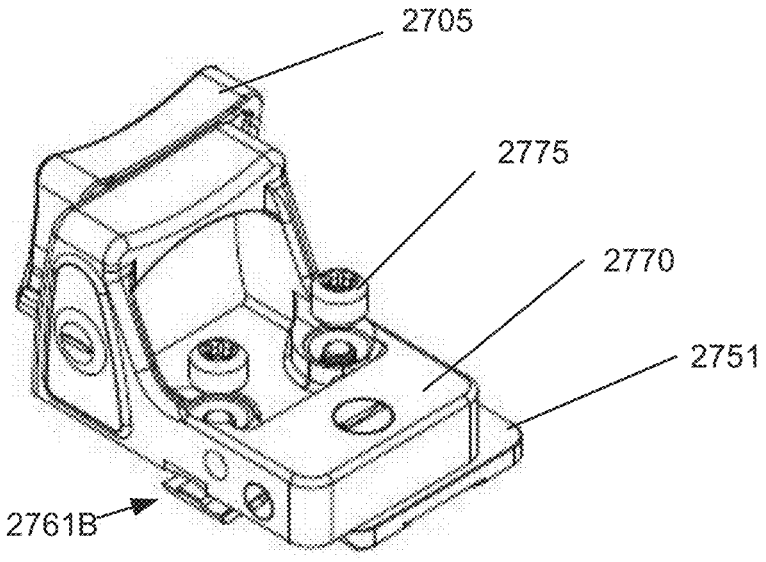


FIG. 27B

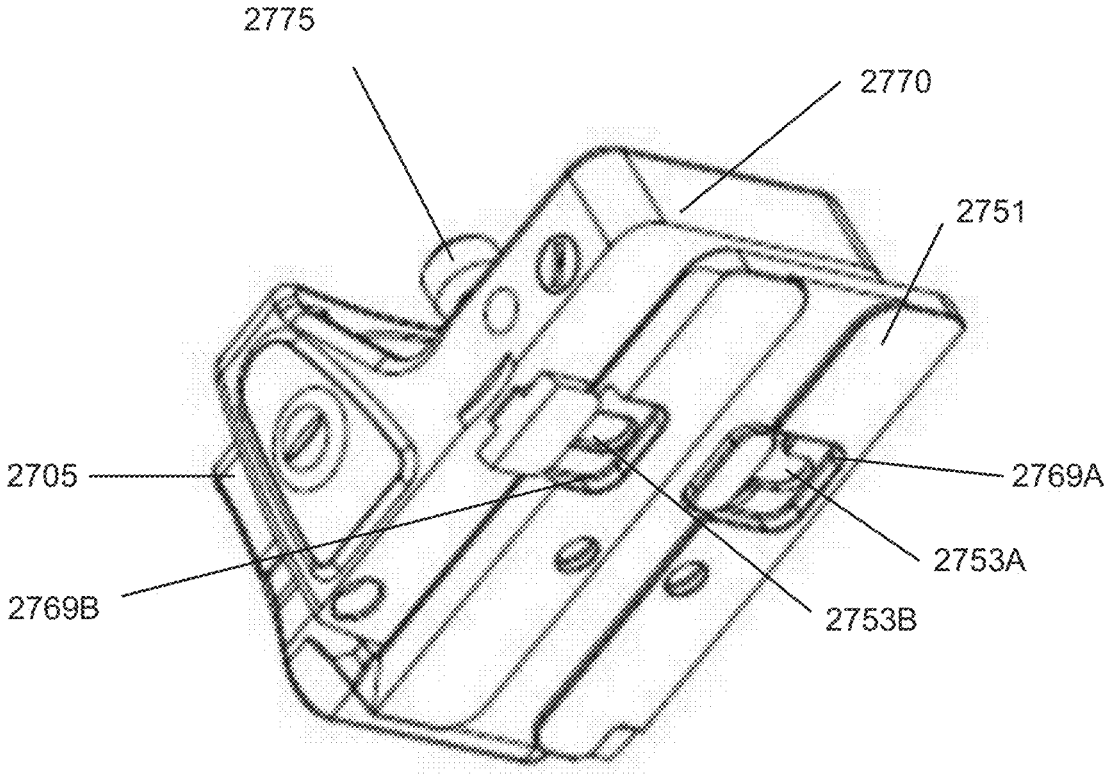


FIG. 27C

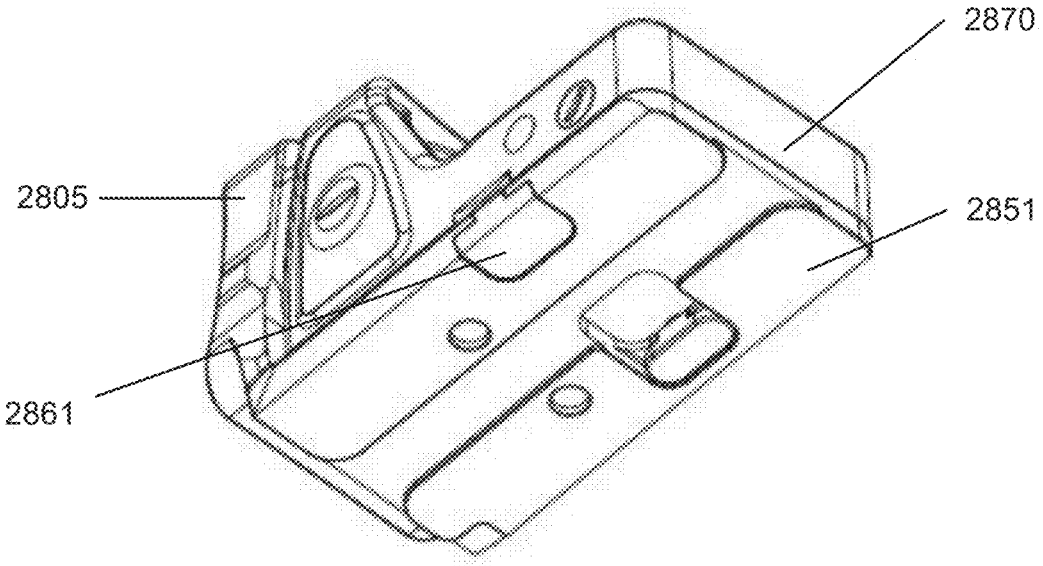


FIG. 28A

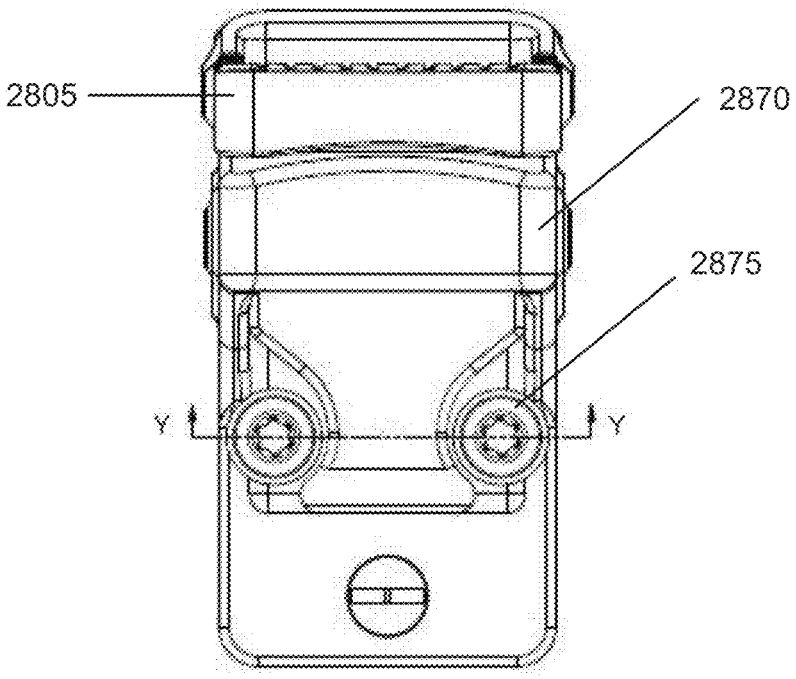


FIG. 28B

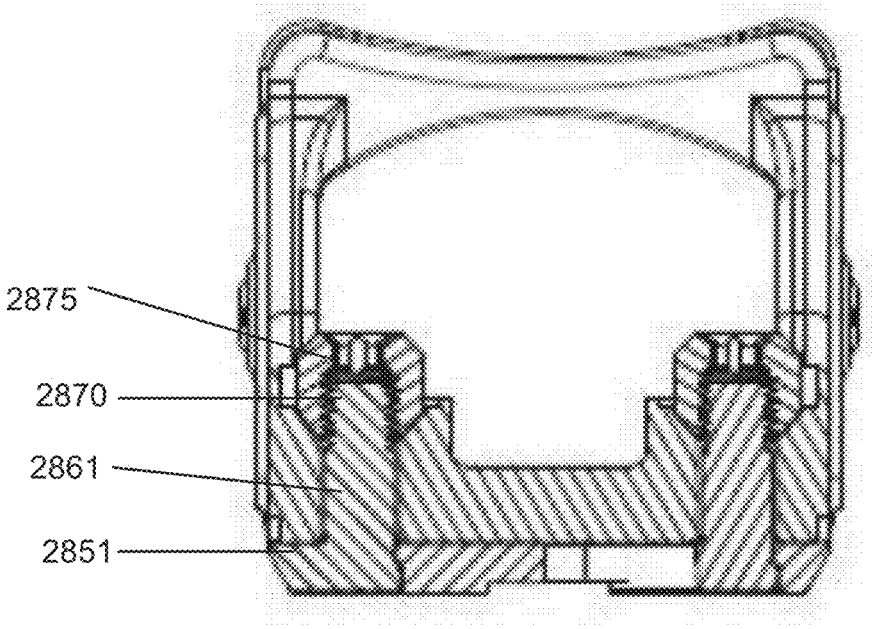


FIG. 28C

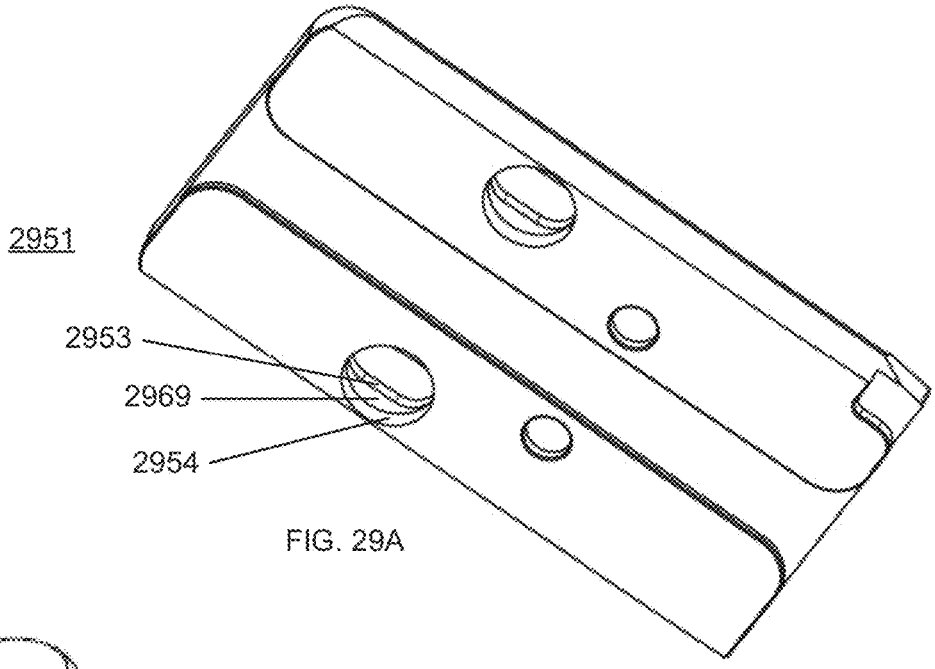


FIG. 29A

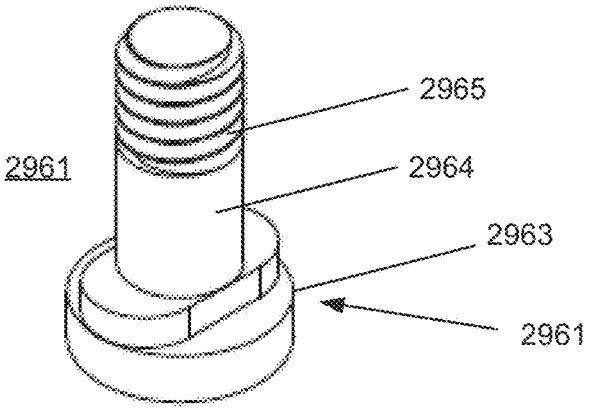


FIG. 29C

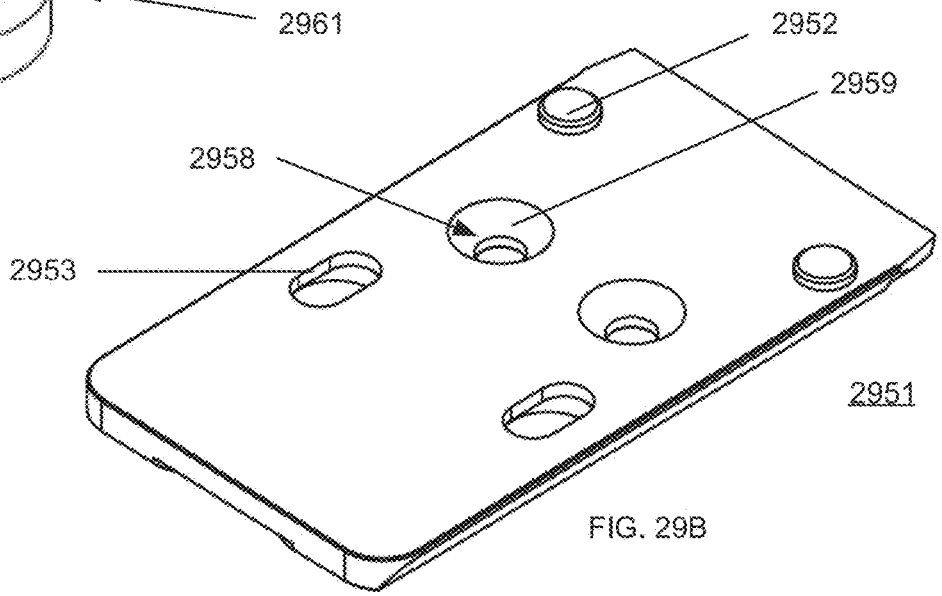


FIG. 29B

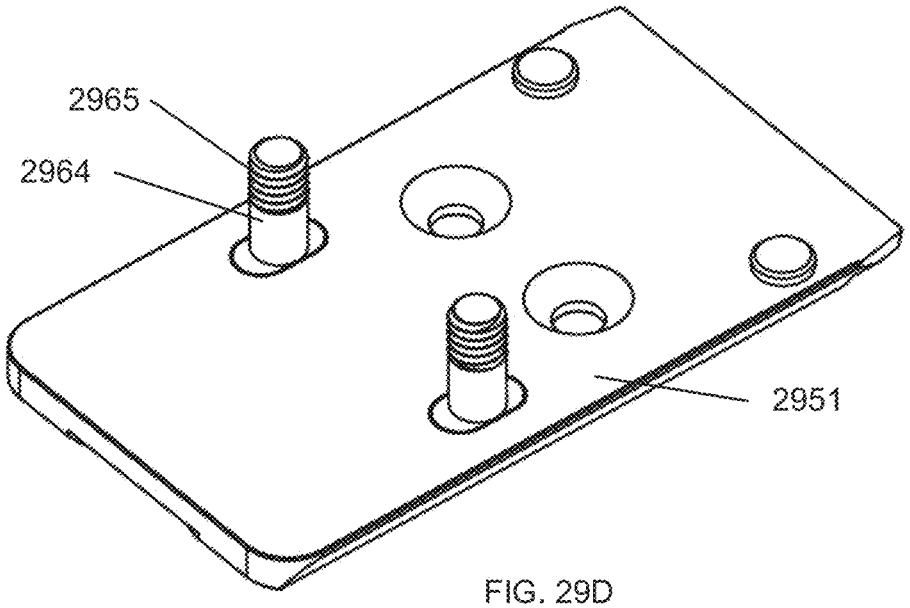


FIG. 29D

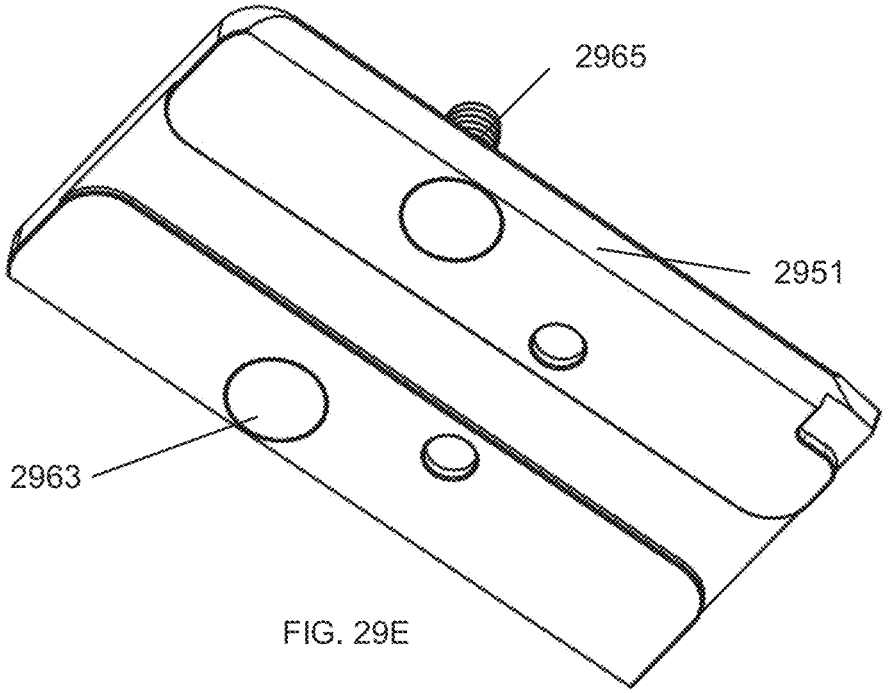


FIG. 29E

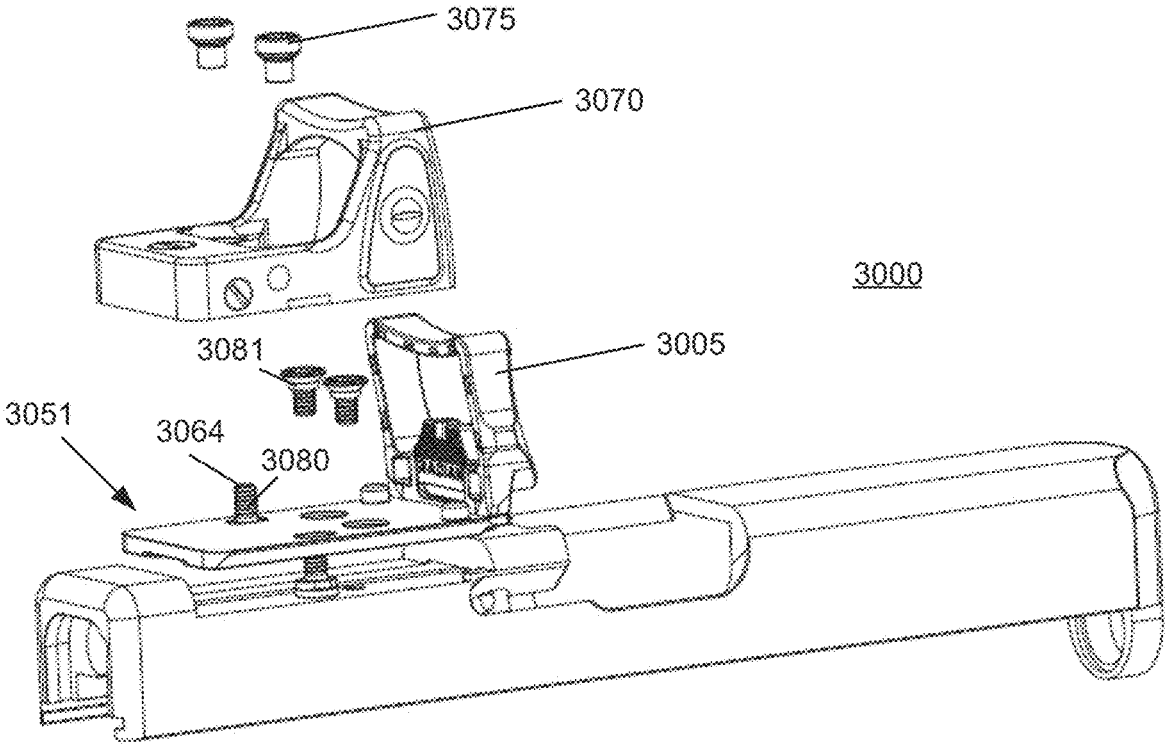


FIG. 30A

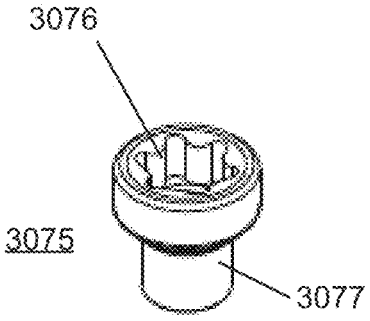


FIG. 30B

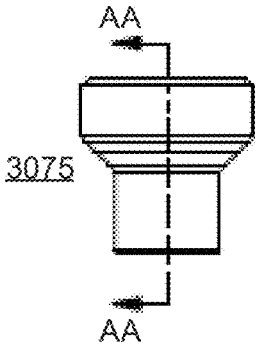


FIG. 30C

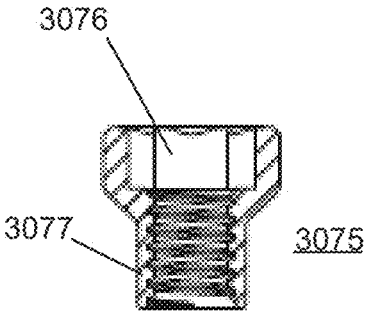


FIG. 30D

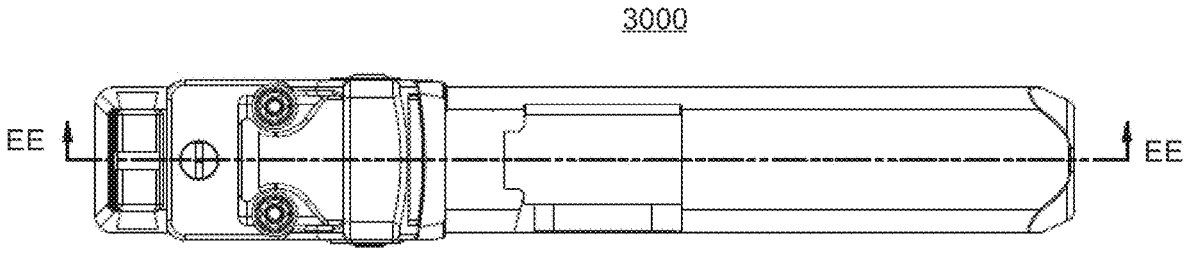


FIG. 30E

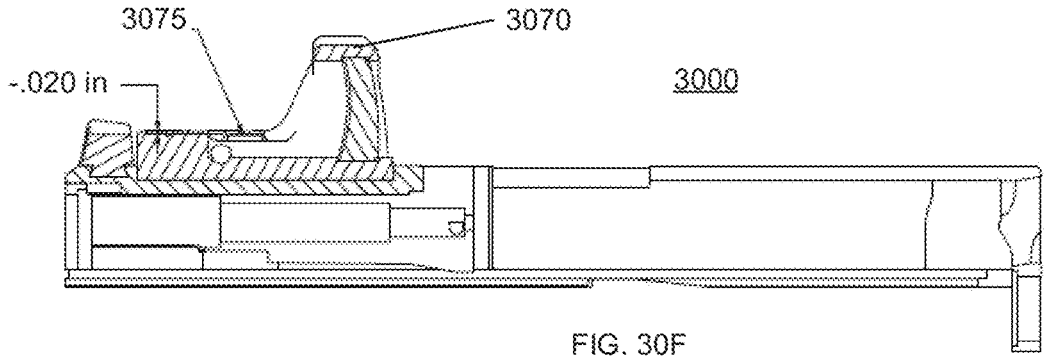


FIG. 30F

(Scale 1.5)

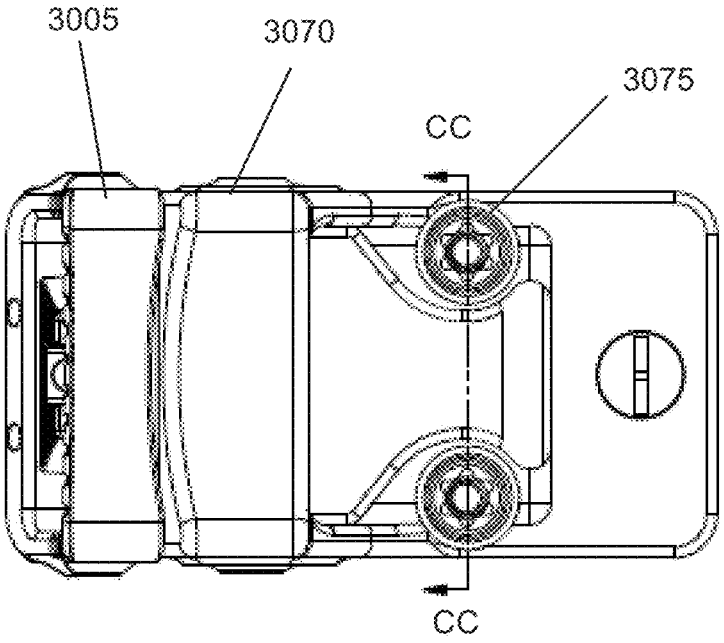


FIG. 31A

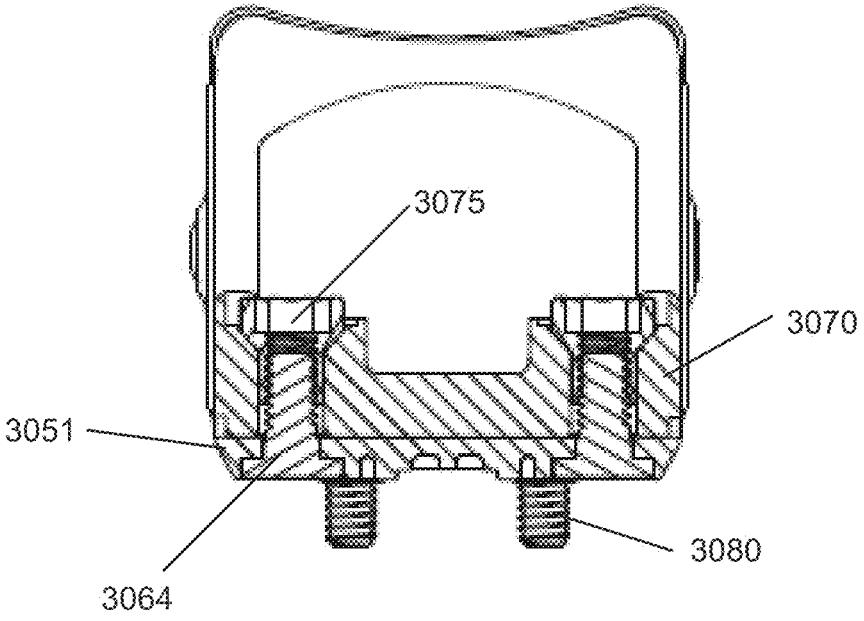


FIG. 31B

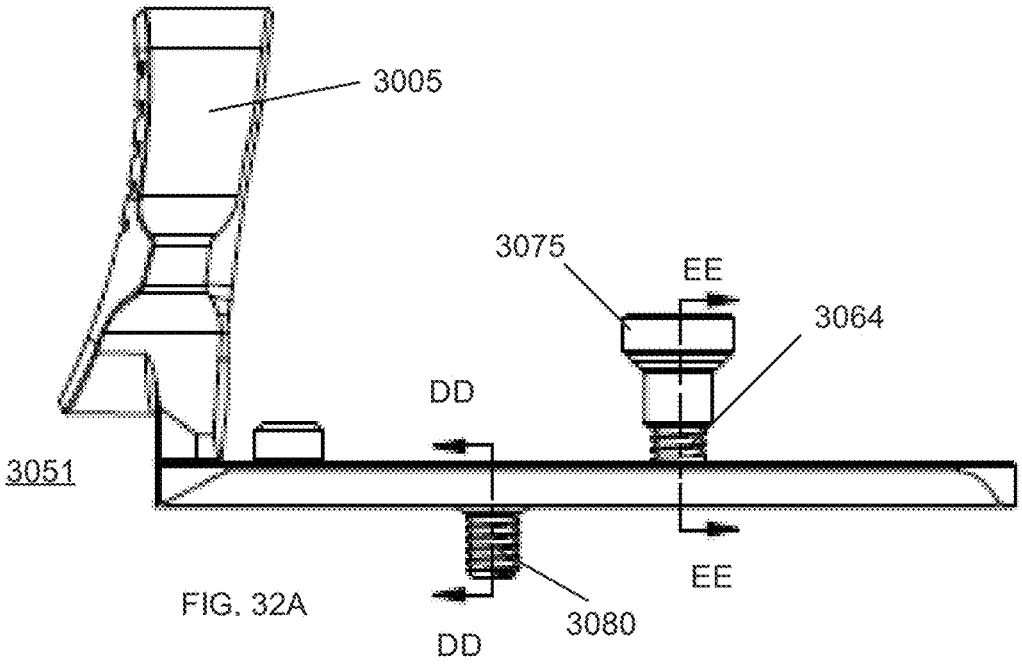


FIG. 32A

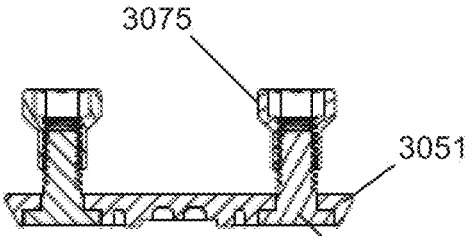


FIG. 32B

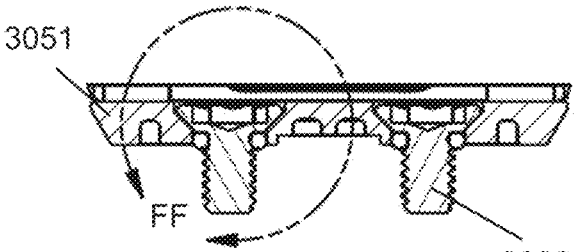


FIG. 32C

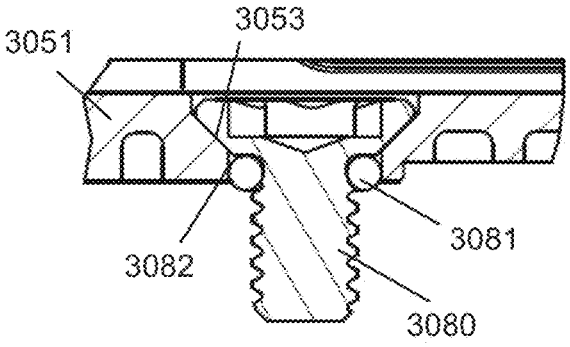


FIG. 32D

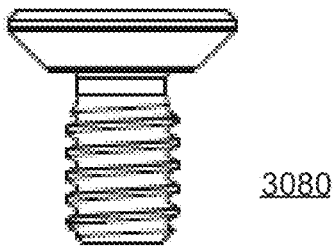


FIG. 32E

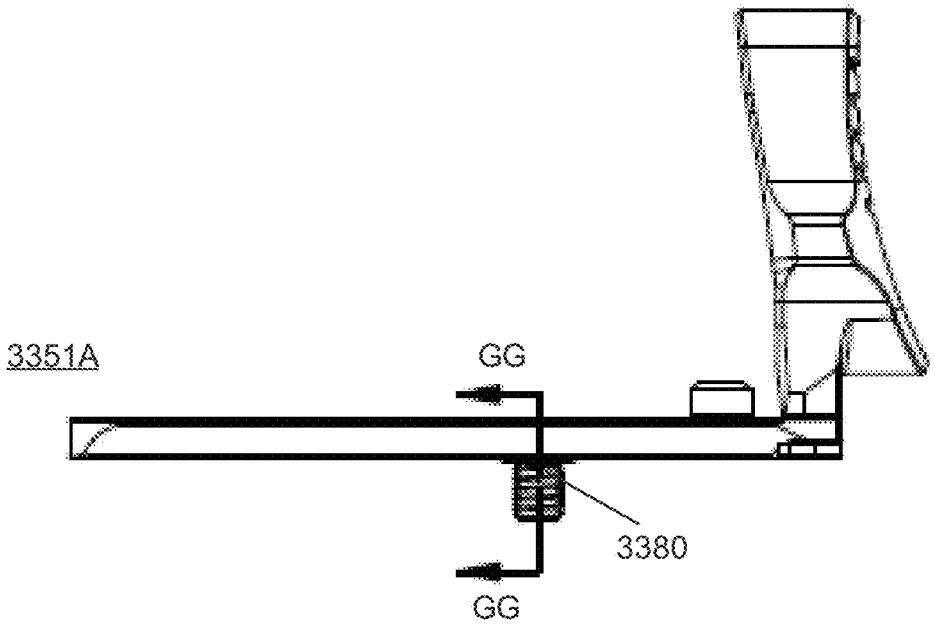


FIG. 33A

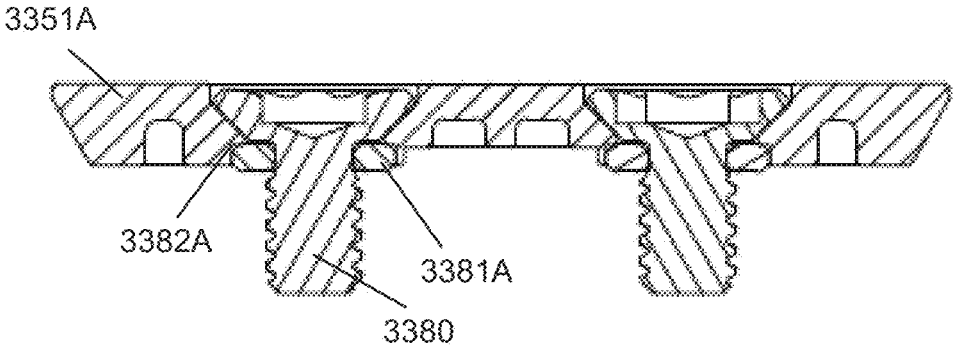


FIG. 33B

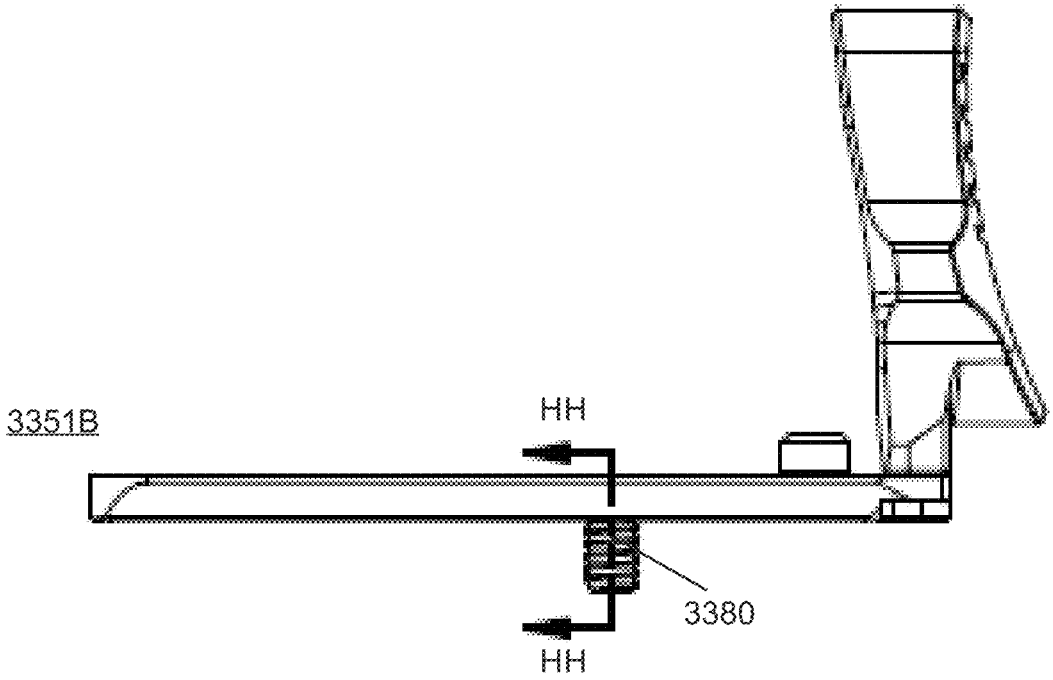


FIG. 33C

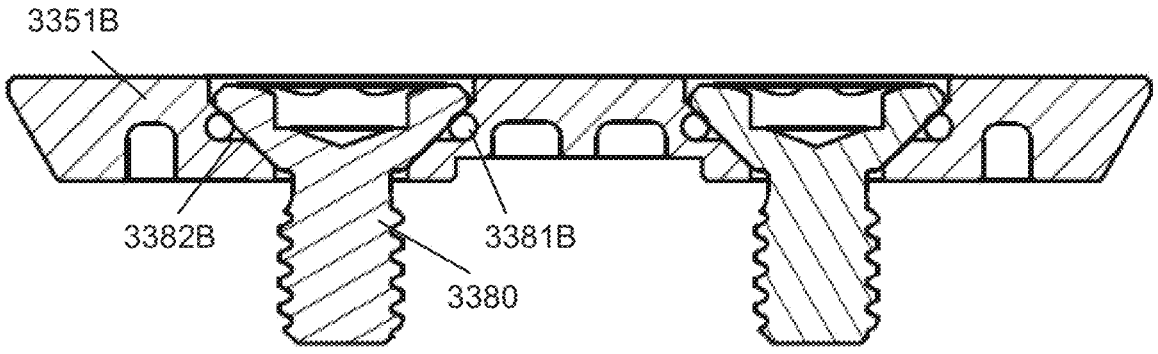


FIG. 33D

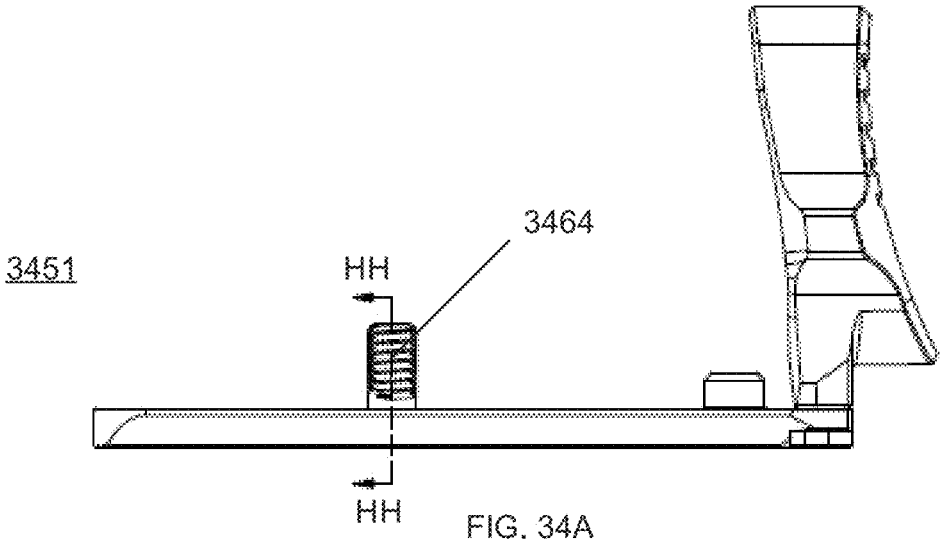


FIG. 34A

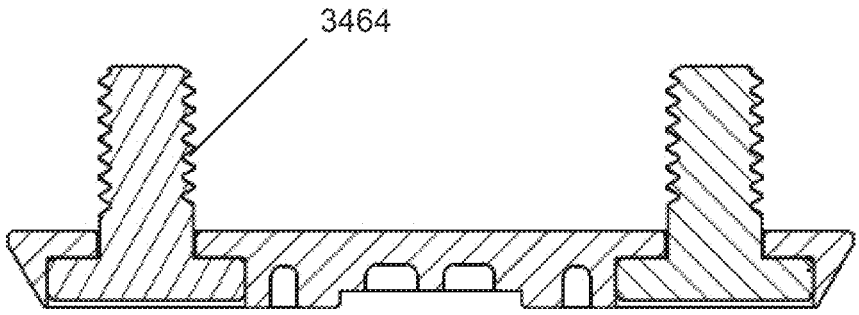


FIG. 34B

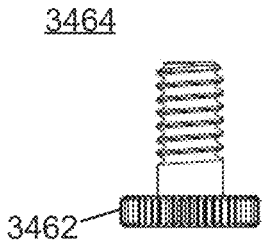


FIG. 34C

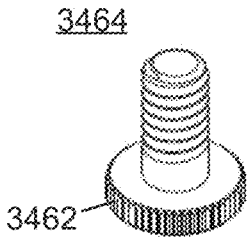


FIG. 34D

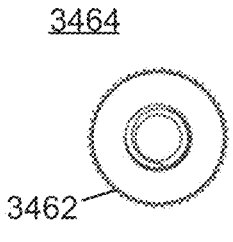


FIG. 34E

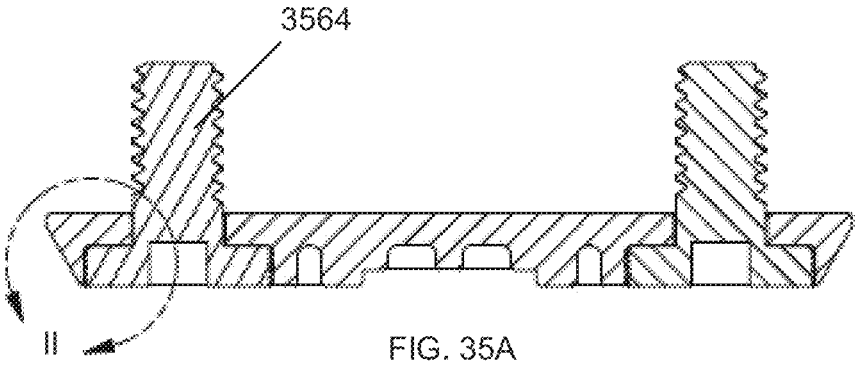


FIG. 35A

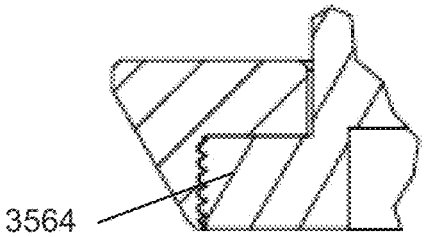


FIG. 35B

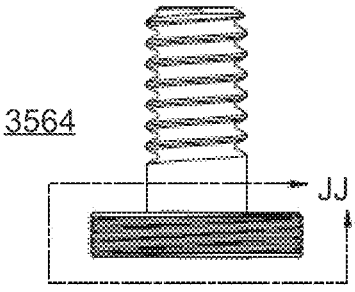


FIG. 35C

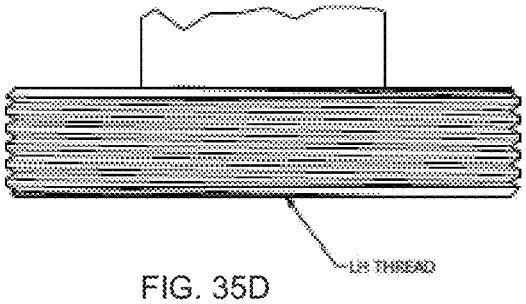


FIG. 35D

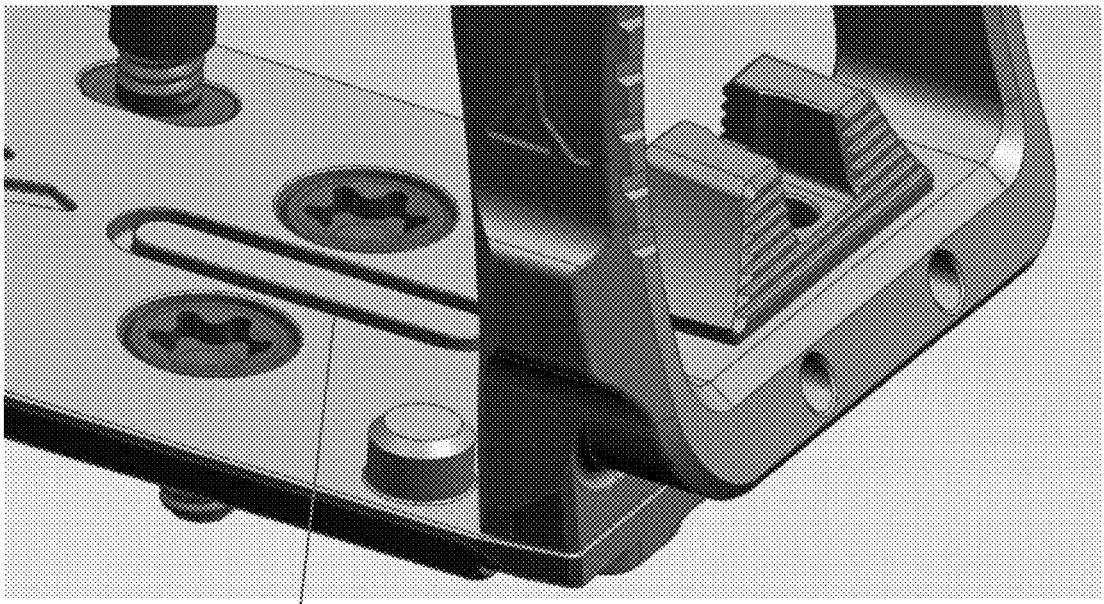


FIG. 36

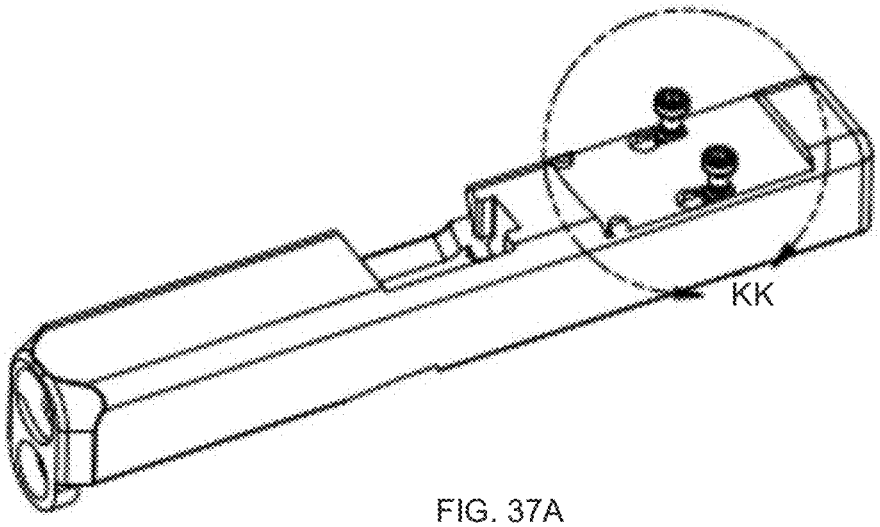


FIG. 37A

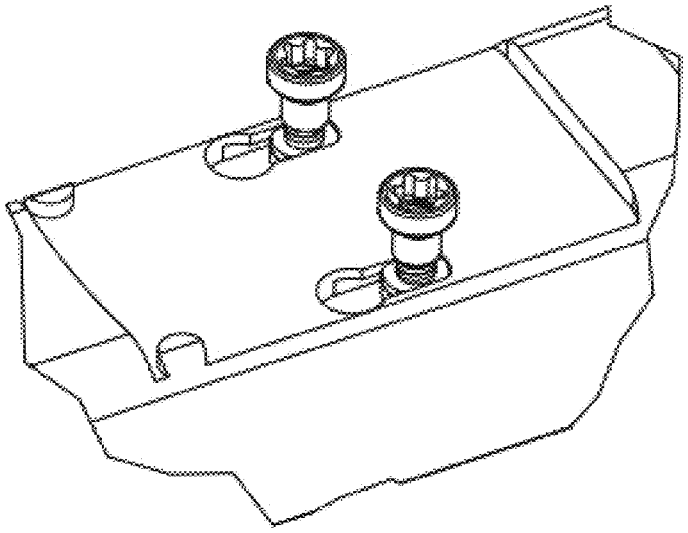


FIG. 37B

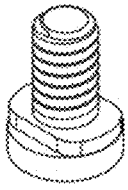


FIG. 37C

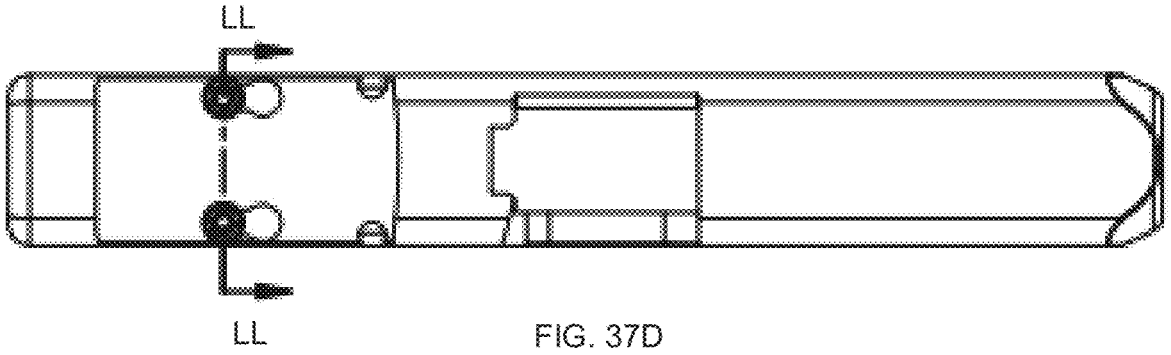


FIG. 37D

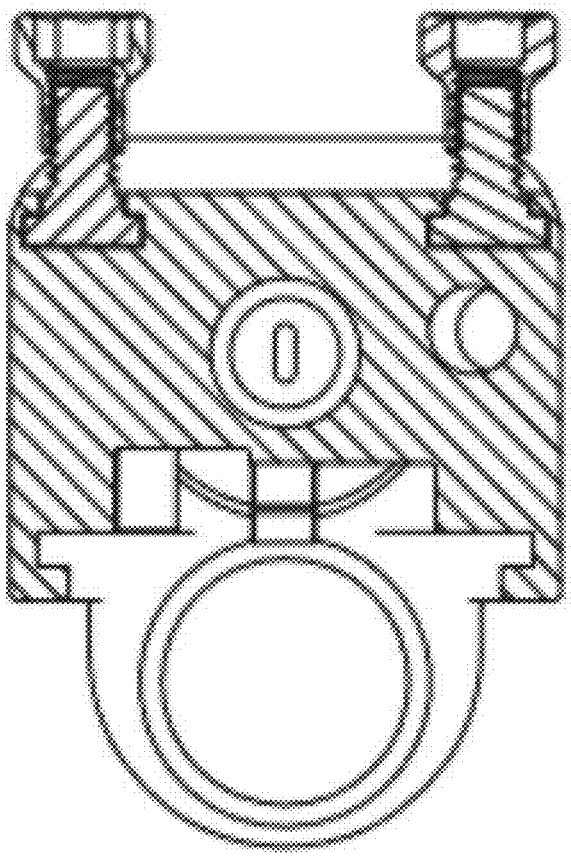


FIG. 37E

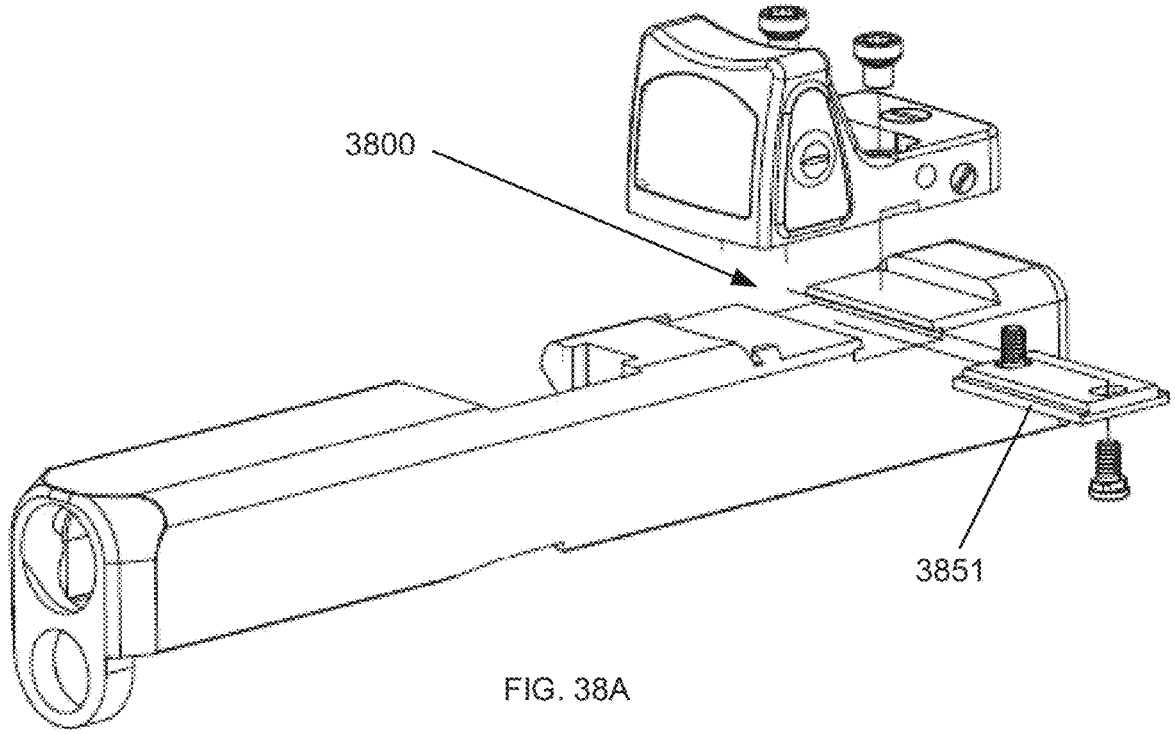


FIG. 38A

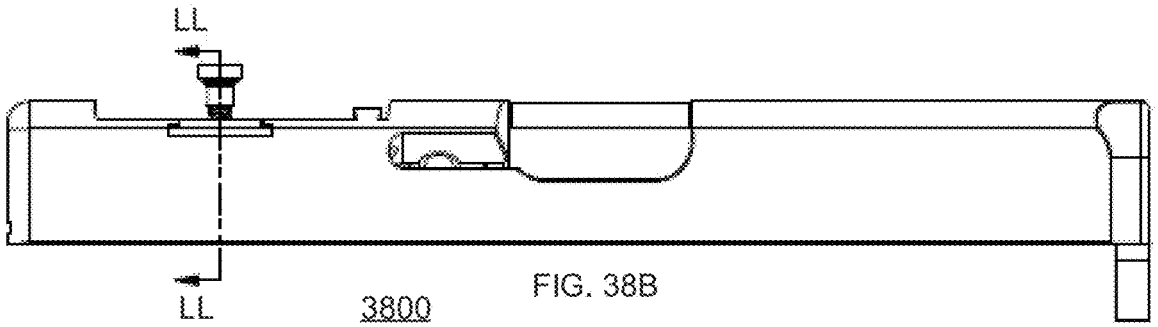


FIG. 38B

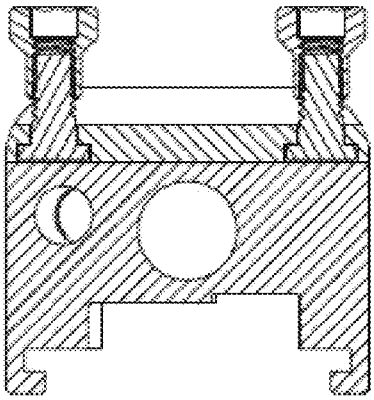


FIG. 38C

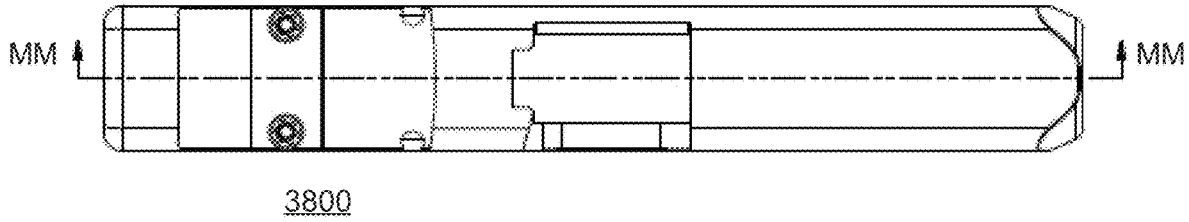


FIG. 38D

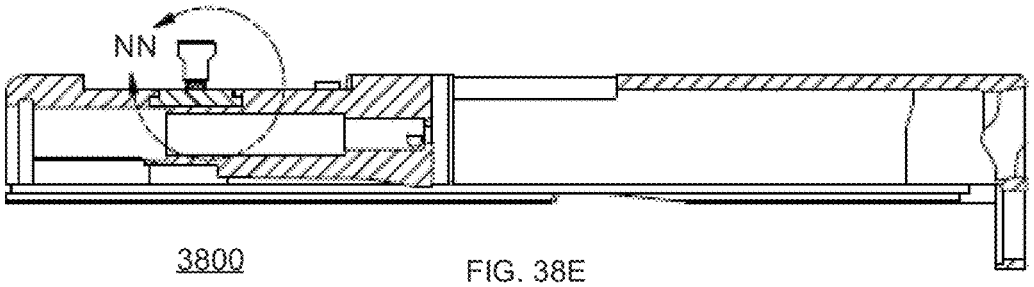


FIG. 38E

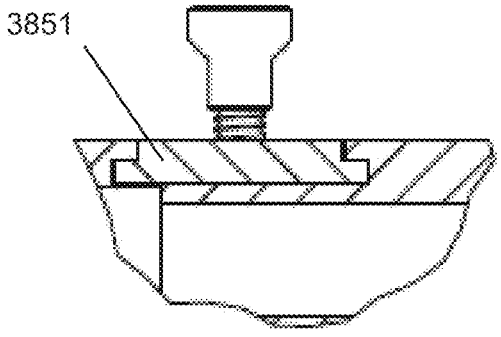


FIG. 38F

ADAPTER ASSEMBLY OR OTHER MOUNTING FEATURES FOR FIREARM OPTIC

PRIORITY

[0001] This application claims priority to U.S. Provisional Application No. 63/220,314 filed on Jul. 9, 2021, which is incorporated by reference herein. This application incorporates by reference U.S. Patent Publication 2021/0231407 entitled "Optic Guard for Firearm".

BACKGROUND

[0002] Typical firearms propel a bullet or other type of projectile through the expansion of gas within a firearm barrel. The majority of the gas may be expelled out of the front of the firearm barrel together with the bullet. However, some firearms may exploit a portion of the gas to reduce recoil.

[0003] An accessory called a compensator can be used to retrofit a firearm with recoil reduction. These accessories are attached to the muzzle end of the barrel. However, this increases the total length of the firearm.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. **1**A illustrates a slide assembly including a bottom view of a slide and a side view of a barrel.

[0005] FIG. **1**B illustrates a partial top view of a slide with an MOS (modular optic system) cover plate removed.

[0006] FIG. **1**C illustrates a bottom view of an MOS adapter plate.

[0007] FIG. **1**D illustrates a slide assembly in which the MOS adapter plate of FIG. **1**C is installed on the slide of FIG. **1**B.

[0008] FIG. **1**E illustrates installation of a sealing plate on the slide assembly of FIG. **1**D.

[0009] FIG. **1**F illustrates a bottom view of an RMR (rugged miniature reflex) optic.

[0010] FIG. **1**G illustrates the RMR optic of FIG. **1**F and the sealing plate of FIG. **1**E installed on the slide assembly of FIG. **1**D.

[0011] FIG. **2**A illustrates a bottom view of a slide for a slide assembly to provide a firearm with gas compensation to reduce recoil.

[0012] FIG. **2**B illustrates a front view of the slide of FIG. **2**A.

[0013] FIG. **3** illustrates a front view of a barrel operable with the slide of FIGS. **2**A-B.

[0014] FIG. **4**A illustrates a partial side view of firearm having slide assembly including the slide illustrated in FIGS. **2**A-B and the barrel illustrated in FIG. **3**.

[0015] FIG. **4**B illustrates a partial side view of firearm of FIG. **4**A in which the slide is retracted.

[0016] FIG. **5**A illustrates a perspective view of a muzzle end of a slide assembly having a gas port formed from an egress in a barrel, a front surface of an arch on the underside of the slide, an opening in the slide, and an interior of a front end of the slide.

[0017] FIG. **5**B illustrates a top view of the slide assembly of FIG. **5**A.

[0018] FIG. **5**C illustrates a cross-sectional view of the slide of the slide assembly of FIG. **5**A taken across a width of the slide assembly.

[0019] FIG. **5**D illustrates a bottom view of the slide assembly.

[0020] FIG. **5**E illustrates a partial side view of the barrel of the slide assembly of FIG. **5**A.

[0021] FIG. **6**A illustrates a cross-sectional view of a muzzle end of the slide assembly of FIG. **5**A taken across a length of the slide assembly.

[0022] FIG. **6**B illustrates a cross-sectional view taken along line AL of FIG. **5**A.

[0023] FIG. **6**C illustrates a cross-sectional view taken along line AC of FIG. **5**A.

[0024] FIG. **6**D illustrates a cross-sectional view taken along line AD of FIG. **5**A.

[0025] FIG. **6**E illustrates a cross-sectional view taken along line AK of FIG. **5**A.

[0026] FIG. **7**A illustrates a side view of a barrel in which rifling may be preserved between the muzzle end of the barrel and a location coinciding with a front-most edge of the egress.

[0027] FIG. **7**B illustrates a cross-sectional view taken across a width of the barrel of FIG. **7**A.

[0028] FIG. **7**C illustrates a cross-sectional view taken along line BA of FIG. **7**B.

[0029] FIG. **7**D illustrates a detailed view of the chamfer on a front-most bore edge of the egress.

[0030] FIG. **8**A illustrates a side view of another barrel in which rifling may be preserved between the muzzle end of the barrel and a location coinciding with a front-most edge of the egress.

[0031] FIG. **8**B illustrates a cross-sectional view taken across a width of the barrel of FIG. **8**A.

[0032] FIG. **8**C illustrates a cross-sectional view taken along line BC of FIG. **8**B.

[0033] FIG. **9**A illustrates a side view of yet another barrel in which rifling may be preserved between the muzzle end of the barrel and a location coinciding with a front-most edge of the egress.

[0034] FIG. **9**B illustrates a cross-sectional view taken across a width of the barrel of FIG. **9**A.

[0035] FIG. **9**C illustrates a cross-sectional view taken along line AY of FIG. **9**B.

[0036] FIG. **10**A illustrates a cross-sectional view taken across a width of a slide assembly with an alignment system to restrict movement of the muzzle end of the barrel within a plane perpendicular to a bore axis of the barrel and prevent rotational movement of the barrel relative to the slide.

[0037] FIG. **10**B illustrates a cross-sectional view taken across a width of the slide assembly of FIG. **10**A.

[0038] FIG. **10**C illustrates a cross-sectional view taken along line AW of FIG. **10**B.

[0039] FIG. **10**D illustrates a cross-sectional view taken along line AV of FIG. **10**B.

[0040] FIG. **10**E illustrates a cross-sectional view taken along line AU of FIG. **10**B.

[0041] FIG. **11**A illustrates a partial top view of a slide assembly including an optic mounting platform integrally formed on the top of the slide and a grip for charging the slide integrally formed from sides below the optic mounting platform.

[0042] FIG. **11**B illustrates a partial side view of the slide assembly of FIG. **11**A.

[0043] FIG. **11**C illustrates the slide of FIGS. **11**A-B being charged using the grip that is integrally formed from the sides below the optic mounting platform.

[0044] FIG. **11**D illustrates a back view of a slide assembly in an embodiment in which the exterior sides of the slide are inward sloping from an upper location below the optic mounting platform to a lower location below the upper location.

[0045] FIG. **11**E illustrates a back view of a slide assembly in another embodiment including an optical mounting platform overhanging completely vertical exterior surfaces of sides of the slide.

[0046] FIG. **12** illustrates a partial side view of a slide assembly in which the RMR optic illustrated in FIG. **1**F is mounted directly on the slide illustrated in FIGS. **11**A-C.

[0047] FIG. **13** illustrates a partial side view of an optic guard with an integrated rear sight.

[0048] FIG. **14**A illustrates a side view of an optic guard usable with the slide and the optic shown in FIG. **1**F.

[0049] FIG. **14**B illustrates a partial side view of a firearm including the optic guard of FIG. **14**A installed thereon.

[0050] FIG. **14**C illustrates a partial side view of a firearm including the optic guard of FIG. **14**A with the RMR optic illustrated in FIG. **1**F installed thereon.

[0051] FIG. **14**D illustrates charging a slide using a grip location provided on an optic guard.

[0052] FIG. **15** illustrates an optic guard including a frame welded to a bracket.

[0053] FIGS. **16**A-B illustrate partial side views of another embodiment of a slide assembly to provide a firearm with gas compensation to reduce recoil in which the barrel includes a sight tracker.

[0054] FIGS. **16**C-D illustrate perspective and side views (respectively) of the barrel of the slide assembly of FIGS. **16**A-B.

[0055] FIGS. **17**A and **17**B show an exploded view and an isometric view, respectively, of a compensator system.

[0056] FIGS. **17**C, **17**D, and **17**E illustrate a top view, a side view, and a front view, respectively, of the compensator system of FIGS. **17**A-B.

[0057] FIG. **17**F illustrates a section view of the compensator system taken along section line C of FIG. **17**D.

[0058] FIG. **17**G illustrates the taper pin of FIG. **17**F in more detail.

[0059] FIGS. **18**A and **18**B illustrate a top view and a side view of the barrel of FIG. **17**A.

[0060] FIG. **18**C illustrates a section view of the barrel of FIGS. **18**A-B, taken along section line E.

[0061] FIG. **19** illustrates a rear view of the gas port device of FIG. **17**A.

[0062] FIG. **20**A illustrates a barrel that may be similar in any respect to the barrel of FIG. **17**A. FIG. **20**B is a detail K of FIG. **20**A.

[0063] FIGS. **21**A, **21**B, **21**C, and **21**D show an exploded view, an isometric view, a top view, and a side view, respectively, of another compensator system.

[0064] FIG. **21**E shows a view taken from line H of FIG. **21**D.

[0065] FIG. **21**F shows an isometric view of the slide-facing side of the gas port device of FIG. **21**A.

[0066] FIGS. **22**A, **22**B, **22**C, **22**D, and **21**E show an exploded view, an isometric view, a top view, and a front view, and a cross-sectional side view, respectively, of another compensator system with a threaded barrel.

[0067] FIG. **23** shows a side view of a threaded barrel-mounted accessory installed on the threaded barrel of the compensator system of FIGS. **22**A-E.

[0068] FIGS. **24**A-D show an exploded view, an isometric view, a front view, and a cross-sectional side view of another compensator system with a threaded barrel.

[0069] FIG. **25**A shows an isometric view showing a top of an adapter assembly for a firearm optic, according to various embodiments.

[0070] FIG. **25**B illustrates an isometric view showing a bottom of the adapter assembly of FIG. **25**A.

[0071] FIG. **25**C illustrates an isometric view illustrating how the adapter assembly of FIG. **25**A is used with a firearm optic.

[0072] FIG. **26**A illustrates an isometric view showing a bottom of the adapter assembly of FIG. **25**A with the firearm optic installed thereon.

[0073] FIG. **26**B illustrates a top view of the adapter assembly of FIG. **25**A with the firearm optic installed thereon.

[0074] FIG. **26**C illustrates a rear view of the adapter assembly of FIG. **25**A with the firearm optic installed thereon along section line Z of FIG. **26**B.

[0075] FIG. **27**A shows an isometric view showing a top of an adapter assembly with an integrated optic guard for a firearm optic, according to various embodiments.

[0076] FIGS. **27**B-C illustrate an isometric view top and bottom views, respectively, illustrating a slide-on installation of a firearm optic on the adapter assembly of FIG. **27**A.

[0077] FIG. **28**A illustrates an isometric view showing a bottom of the adapter assembly of FIG. **27**A with the firearm optic installed thereon.

[0078] FIG. **28**B illustrates a top view of the adapter assembly of FIG. **27**A with the firearm optic installed thereon.

[0079] FIG. **28**C illustrates a rear view of the adapter assembly of FIG. **27**A with the firearm optic installed thereon along section line Y of FIG. **26**B.

[0080] FIG. **29**A shows a bottom of another bracket for a firearm optic, according to various embodiments.

[0081] FIG. **29**B shows a top view of the bracket of FIG. **29**A.

[0082] FIG. **29**C shows an isometric view of a fastener receivable by the bottom of the bracket of FIG. **29**A.

[0083] FIG. **29**D shows a bottom view of the bracket of FIGS. **29**A-B having the fasteners (FIG. **29**C) inserted therein, according to various embodiments.

[0084] FIG. **29**E shows a top view of the bracket arranged as shown in FIG. **29**D.

[0085] FIG. **30**A shows an isometric view of a slide assembly for a firearm, according to various embodiments.

[0086] FIG. **30**B shows an isometric view of the sleeve nut of the slide assembly of FIG. **30**A.

[0087] FIG. **30**C shows a side view of the sleeve nut of FIG. **30**A.

[0088] FIG. **30**D shows a section view of the sleeve nut of FIGS. **30**A-B taken along section line AA.

[0089] FIG. **30**E illustrates a top view of the slide assembly of FIG. **30**A.

[0090] FIG. **30**F illustrates a section view of the slide assembly of FIG. **30**E taken along section line EE.

[0091] FIG. **31**A shows a top view of the adapter assembly of FIG. **30**A.

[0092] FIG. **31**B shows a section view of the adapter assembly of FIG. **31**A taken along section line CC.

[0093] FIG. **32**A shows a side view of the bracket of FIG. **30**A.

[0094] FIG. **32**B shows a section view of the bracket of FIG. **32**A taken along section line DD of FIG. **32**A.

[0095] FIG. **32**C shows a section view of the bracket of FIG. **32**A taken along section line EE of FIG. **32**A.

[0096] FIG. **32**D is a detailed view FF of FIG. **32**C.

[0097] FIG. **32**E is a side view of the fastener shown in FIG. **32**D.

[0098] FIG. **33**A is a side view of another bracket with sealing features, according to various embodiments.

[0099] FIG. **33**B is a section view of the bracket of FIG. **33**A taken along section line GG.

[0100] FIG. **33**C is a side view of another bracket with sealing features, according to various embodiments.

[0101] FIG. **33**D is a section view of the bracket of FIG. **33**C taken along section line HH.

[0102] FIG. **34**A shows a side view of another bracket similar in various respects to the bracket of FIG. **32**A, according to various embodiments.

[0103] FIG. **34**B shows a section view of the bracket of FIG. **34**A taken along section line HH of FIG. **34**A.

[0104] FIGS. **34**C-E show side, isometric, and top views, respectively, of the stud of the bracket of FIG. **34**A.

[0105] FIG. **35**A shows is sectional view of another bracket, according to various embodiments.

[0106] FIG. **35**B is a detailed view II of FIG. **35**A.

[0107] FIG. **35**C is a side view of the fastener shown in FIG. **35**A.

[0108] FIG. **35**D is a detailed view JJ of FIG. **35**C.

[0109] FIG. **36** illustrates a partial isometric view of a top of an adapter assembly to illustrate a seal channel, according to various embodiments.

[0110] FIG. **37**A illustrates a slide assembly with a bolt and sleeve nut for direct mounting an optic to a firearm, according to various embodiments.

[0111] FIG. **37**B is a detailed view KK of FIG. **37**A.

[0112] FIG. **37**C is an isometric view of the bolt of FIG. **37**A.

[0113] FIG. **37**D is a top view of the slide assembly of FIG. **37**A.

[0114] FIG. **37**E is a section view of the slide assembly of FIG. **37**D taken along section line LL.

[0115] FIG. **38**A illustrates a slide assembly including an adapter assembly that is slot-mounted to the slide, according to various embodiments.

[0116] FIG. **38**B illustrates a side view of the slide assembly of FIG. **38**A.

[0117] FIG. **38**C illustrates a section view taken along section line LL of FIG. **38**A.

[0118] FIG. **38**D illustrates a top view of the slide assembly of FIG. **38**A.

[0119] FIG. **38**E illustrates a sectional view taken along section line MM of FIG. **38**D.

[0120] FIG. **38**F illustrates a detailed view NN of FIG. **38**E.

DETAILED DESCRIPTION

Slide Assembly to Provide Gas Compensation to Reduce Recoil

[0121] Services have been offered to bore openings in a slide assembly to guide gas propelled from a chamber of a firearm in a direction to provide recoil reduction. The service provider obtains a slide assembly from the customer, removes material from various components of the slide assembly, and then returns the slide assembly to the customer.

[0122] In some services, the service provider removes material from a top half of the barrel to form a gas port. The service provider may also remove material from the top and/or sides of the slide around the gas port in the barrel in an attempt to vent some of the gas exiting the gas port out top and/or sides the slide. However, if these slide vents are not effective at venting the gas exiting the gas port, then the unvented gas may distribute carbon particles throughout the firearm, which may eventually degrade operation of the firearm.

[0123] Also, removing the material from the gas port in the barrel may leave burs that may contact a bullet passing by the gas port (on its way to the muzzle)—changing its trajectory. These burs may also strip material from the passing bullet. This stripped material, like the carbon particles, may be distributed through the firearm, which may eventually degrade operation of the firearm (also the stripped material is a safety concern for the shooter and/or bystanders).

[0124] FIG. **1**A illustrates a slide assembly including a bottom view of a slide **100** and a side view of a barrel **105**. In this example, the slide **100** and barrel **105** are Glock-compatible. A Glock-compatible firearm component is compatible with the Glock design (but may be produced by a third party).

[0125] The barrel **105** includes a breech **3**, a muzzle **2**, and a length including a cylindrical bore length segment **4** (which includes the bore of the barrel **105**) and a non-cylindrical barrel hood segment **5** (which includes the chamber of the barrel **105**).

[0126] When the barrel **105** is locked into the slide **100**, a tip of the muzzle end of the barrel **105** protrudes from the front of the slide **100**. There are gaps between the rest of the bore length segment and the interior of the top and the sides of the slide **100**. In particular, the width (w**1**) of the interior of the slide **100** corresponds to the width of the barrel hood, which accommodates rearward movement of the slide **100** relative to the barrel **105** following firing of the firearm. A wear marking **19** can be seen on the underside of the top of the slide **100** where the top of the barrel hood **18** (e.g., the side opposite the lugs **6**) slides against the underside of the top of the slide **100** during this movement (the length of this wear marking **19** corresponds to the length of stroke of the firearm). In this slide assembly, these gaps are continuous from the opening **13** (which receives the top **18** of the barrel hood) past the sight mount **5** to the front interior wall **12** of the slide.

[0127] FIG. **2**A illustrates a bottom view of a slide **200** for a slide assembly to provide a firearm with gas compensation to reduce recoil. FIG. **2**B illustrates a front view of the slide **200**.

[0128] The slide **200** may have the same compatibility as the slide **100** of FIG. **1**. For instance, the slide **200** may be a retrofit for a firearm manufactured with the slide **100** of FIG. **1**, in some examples (the slide **200** of course may also be an original part of a firearm, in other examples).

[0129] The interior of the top and sides of the slide **200** define an arch **21**. A width (w**2**) of an interior of the arch **21** may be less than the width (w**1**). The same reference number w**1** is used to indicate that the width behind the arch **21** may be the same as the width between the interior sides of the

slide **100** of FIG. **1**A. The width (w**2**) may correspond to a width of the bore length segment **4** (FIG. **1**A).

[0130] Behind the arch **21** is a barrel hood channel **20** with the width (w**1**) and a depth (dl) corresponding to a height of the barrel hood **5** (FIG. **1**A). The barrel hood channel **20** may receive the barrel hood through a range of motion of the slide **200** relative to the barrel responsive to a firing of the firearm. When the barrel is locked into the slide **200**, a gap between the bore length segment of the barrel and the interior top and sides of the slide **200** in the barrel hood channel **20** may be the same as the gap with the bore length segment **4** and interior of the sides of the slide **100** (FIG. **1**). In contrast, in a slide assembly using the slide **200**, the gap between the bore length segment and the protrusions that define the interior sides and underside of the arch **21** may be less. In some embodiments, an underside of the arch **21** may be arranged to slidingly engage the upper region of the bore length segment in part of the range of motion (although this is not required). In some embodiments, the width (w**2**) may be at least the width of the bore length segment.

[0131] FIG. **3** illustrates a front view of a barrel **300** operable with the slide **200** of FIGS. **2**A-B. An upper section of the barrel **300** (proximate to the muzzle **32**) defines an egress **39** for gas propelled from the chamber of the firearm. In this example, a rib **38** is located between the openings. The egress **39** may be formed by removing material from a barrel similar to the barrel **105** (FIG. **1**A).

[0132] Referring again to FIGS. **2**A-B, the slide **200** may define an opening **23** in front of the arch **21** to expose the egress **39** (FIG. **3**). In this embodiment, the opening **23** is a single contiguous opening; however, this is not required. Also, in this embodiment, the opening **23** is defined by protrusions on both the top and sides of the slide **200**; however, this is not required. In other embodiments, the opening **23** may be defined by protrusions on the top and/or sides of the slide **200**.

[0133] In this embodiment, protrusions **22** defined by the interior of the sides of the slide **200** may be located in front of the arch **21**. The distance between surfaces of the protrusions **22** may be the same as the distance w**2**.

[0134] The slide **200** may include a sight mount opening **25** behind the arch **21**. In this embodiment, the slide **200** also includes a window **27** located behind the arch **21** (the window **27** may facilitate cooling of the barrel **300**; however, other embodiments may omit the window **27**).

[0135] Referring again to FIG. **3**, removing material from the egress **39** may be selective to form a rib **38** between separate bore openings of the egress **39**. The exterior of the rib **38** is arranged to engage the underside of the arch **21** (FIG. **2**A) following firing. This engagement prevents the underside of the arch **21** from catching on the egress **39**. By selectively removing material from the egress **39** to leave the rib **38**, the size of the egress **39** may be optimized to extend across substantially all of an upper half of a front section of the bore length segment of the barrel **300**.

[0136] FIG. **4**A illustrates a partial side view of firearm having slide assembly **400** including the slide **200** illustrated in FIGS. **2**A-B and the barrel **300** illustrated in FIG. **3**. FIG. **4**B illustrates a partial side view of firearm of FIG. **4**A in which the slide **200** is retracted.

[0137] This embodiment includes a gas port **49** formed by the egress **39** of the barrel **300**, a front surface **45** of the arch **21** (FIGS. **2**A-B), the protrusions **22** (FIGS. **2**A-B), an interior of a front of the slide **200**, and the opening **23** (FIGS. **2**A-B). In particular, sidewalls of the gas port **49** may include a surface of sidewalls of the egress **39**, the front surface **45** of the arch **21**, a surface of the protrusions **22**, a surface of the interior of the front of the slide **200**, and a surface of sidewalls of the opening **23**. In other embodiments, a barrel gas port may be located a distance from one or more of the front surface **45** (the arch **21** may be located a distance behind the barrel gas port), a distance from surfaces of the interior of the sides of the slide (these surfaces may or may not include the protrusion **22**), a distance from a surface of the interior of the front of the slide, and/or a distance from a surface of sidewalls of opening(s) in the slide.

[0138] In this embodiment, a group **48** of holes is located on the sides **42** of the slide (only one of the sides **42** is shown in this view). Each hole may include a first end on the exterior surface of the sides **42** and a second end on a sidewall of the gas port **49**. The group **48** of holes may be omitted in other embodiments.

[0139] A transition edge between the top **41** and sides **42** of the slide **200** may be sloped (e.g., a beveled edge). A portion of a perimeter of the opening **23** (FIGS. **2**A-B) in the slide **200** may be located on this sloped edge, as in the illustrated embodiment; however, this is not required.

[0140] FIG. **5**A illustrates a perspective view of a muzzle end of a slide assembly having a gas port formed from an egress in a barrel, a front surface of an arch on the interior of the slide, an opening in the slide, and an interior of a front end of the slide. In this embodiment, the back wall **51** of the gas port is a continuous wall defined by a front surface of an arch and a back wall of the barrel egress (the arch may be similar in any respect to the arch **21** of FIGS. **2**A-B).

[0141] FIG. **5**B illustrates a top view of the slide assembly of FIG. **5**A. The sides **52** of the gas port is a continuous wall defined by protrusions on an interior of the slide (the protrusions may be similar in any respect to protrusions **22** of FIGS. **2**A-B) and extending to meet up with the bottom edge of the barrel egress of the barrel.

[0142] FIG. **5**C illustrates a cross-sectional view of the slide assembly of FIG. **5**A taken across a width of the slide assembly. In this view, the alignment **54** of the barrel egress to a slide opening geometry is shown.

[0143] FIG. **5**D illustrates a bottom view of the slide assembly. The protrusions on the interior surface of the sides of the slide may sealingly engage **53** the barrel.

[0144] FIG. **5**E illustrates the barrel of the slide assembly of FIG. **5**A. This barrel may be similar in any respect to barrel **300** of FIG. **3**. This barrel optionally includes scalloping, which may be visible through a window similar to window **27** (FIG. **2**A).

[0145] FIG. **6**A illustrates a cross-sectional view of a muzzle end of the slide assembly of FIG. **5**A taken across a length of the slide assembly. FIG. **6**B illustrates a cross-sectional view taken along line AL of FIG. **6**A. FIG. **6**C illustrates a cross-sectional view taken along line AC of FIG. **6**A. A gas port **61** formed by an egress in a barrel and an opening in a slide is shown (this gas port may be similar in any respect to any gas port described herein).

[0146] FIG. **6**D illustrates a cross-sectional view taken along line AD of FIG. **6**A. Behind the gas port **61** (FIG. **6**C), material **62** of protrusions on an interior of the top and sides of the slide extend toward the barrel. This material **62** may be material of an arch similar to arch **21** of FIG. **2**A. FIG.

6E illustrates a cross-sectional view taken along line AK of FIG. 6A. A barrel hood channel **63** is shown in this view.

[0147] FIGS. **16**A-B illustrate a partial side view of another embodiment of a slide assembly **1600** to provide a firearm with gas compensation to reduce recoil in which the barrel **1630** includes a sight tracker **1699**. The barrel **1630** is locked with the slide **1620** in the partial side view of FIG. **16**A. The partial side view of FIG. **16**B shows a state following firing once the slide **1620** has moved relative to the barrel **1630**.

[0148] Referring again to FIG. **16**A, the slide **1620** may be similar to slide **200** (FIG. **2**A) in any respect. The barrel **1630** may be similar to barrel **300** (FIG. **3**) in any respect. The gas port **1649** may be similar to gas port **49** (FIG. **4**A) in any respect. The sight tracker **1699** includes a rib section **1650**. In this embodiment of the sight tracker **1699**, the sight tracker **1699** defines an additional gas port **1680** (cut through a center of the rib section **1650** and exposing an egress at an uppermost part of the barrel).

[0149] As shown in FIG. **16**B, a top surface of sight tracker **1699** may protrude from the slide **1620** at least following a firing of the firearm (when the front of the barrel **1630** may rise with respect to the slide **1620**). Using the sight tracker **1699**, and due to the recoil reduction provided by the gas port **1649**, a user may continue tracking a target more easily from one round to the next than in the same firearm without the firearm assembly **1600**.

[0150] In this embodiment, an arc segment **1631** (FIG. **16**A) of the barrel is located between an edge of the egress **1639** and the sight tracker **1699**. FIGS. **16**C-D illustrate perspective and side views (respectively) of the barrel **1630**. The arc segment **1631** is shown in detail in FIG. **16**C. In contrast to the sight opening **5** (FIG. **1**A) which is in the slide **100**, this front sight mount **1695** is part of the barrel. In this embodiment, the front sight mount **1695** is a dovetail groove, but other embodiments may utilize some other channel (or some other structure to mate with a bottom of a front sight). In other embodiments, a front sight and the barrel may be a unitary structure.

Barrel Interior

[0151] An egress on a barrel may be deburred to clear a path for the bullet. Also, to prevent stripping material from the bullet, some of the rifling inside the barrel near the muzzle may be removed (which may reduce stripping of the bullet as it passes the egress). Essentially, the muzzle end of the bore may be bored out by a tool inserted into the muzzle end of the barrel to remove rifling of the muzzle end of the bore to reduce or prevent bullet stripping. In one embodiment, the barrel is bored from the muzzle end of the barrel to behind the rear-most edge of the egress **39**, e.g., about half a millimeter behind the rear-most edge, to prevent bullet striping. However, this is not required—in other embodiments rifling may be removed from the muzzle end of the barrel to a location corresponding with a front-most edge of the egress **39**. However, other approaches are described below, and these approaches may eliminate bullet stripping without requiring removal of the rifling between the muzzle end of the barrel and the location corresponding with either edge of the egress **39**.

[0152] FIG. **7**A illustrates a side view of a barrel **700** in which rifling may be preserved between the muzzle end **702** of the barrel and a location coinciding with a front-most edge of the egress **739**. The barrel **700** may be similar in any respect to the barrel described with reference to FIG. **3**, or any other barrel described herein.

[0153] FIG. **7**B illustrates a cross-sectional view taken across a width of the barrel **700** of FIG. **7**A. In this example, the egress **739** spans a distance from a middle of the side of the barrel to an edge of the rib **738** at the top of the barrel **700**. The rifling on the inside of the rib **738** may assist in imparting rotation to the bullet.

[0154] FIG. **7**C illustrates a cross-sectional view taken along line BA of FIG. **7**B. In this view, the chamfer **710** on the bore-edge of the egress **739** is visible. FIG. **7**D illustrates a detailed view of the chamfer **710** on a front-most bore-edge of the egress. This chamfer **710** may be provided on an entire front-most bore edge of the egress **739**. Other edges may include chamfers, although chamfers are not required on the entirety of the other edges to prevent bullet stripping. The chamfer **710** may be formed by removing material from the egress **739**, and then cutting the chamfer **710** on the front-most edge of the egress **739**.

[0155] FIG. **8**A illustrates a side view of another barrel in which rifling may be preserved between the muzzle end of the barrel and a location coinciding with a rear-most or front-most edge of the egress. FIG. **8**B illustrates a cross-sectional view taken across a width of the barrel of FIG. **8**A. FIG. **8**C illustrates a cross-sectional view taken along line BC of FIG. **8**B. In this view, the circumferential groove **810** can be seen. The circumferential groove **810** may have sloped sidewalls (e.g., a V-shaped groove) in which the circumferential groove **810** is centered on the front-most edge of the egress **839** (in other examples, the circumferential groove **810** may be centered on the rear-most edge of the egress **839**). In some embodiments, circumferential grooves may be centered on the front-most edge of the egress **839** and the rear-most edge of the egress **839**, respectively.

[0156] FIG. **9**A illustrates a side view of yet another barrel in which rifling may be preserved between the muzzle end of the barrel and a location coinciding with a rear-most or front-most edge of the egress. FIG. **9**B illustrates a cross-sectional view taken across a width of the barrel of FIG. **9**A. FIG. **9**C illustrates a cross-sectional view taken along line AY of FIG. **9**B. In this view, the circumferential groove **910** can be seen. The circumferential groove **910** may have sloped sidewalls (e.g., sidewalls similar to circumferential groove **810** of FIG. **8**C) and additionally may have a bottom width between bottoms of the sidewalls.

[0157] In one example, the bottom width may be a flat bottom, although this is not required. The circumferential groove **910** need not necessarily be centered on the front-most or rear-most bore-edge of the egress **939**. This may improve manufacturing tolerances as compared to the chamfer **710** or the V-shaped circumferential groove. The front-most or rear-most edge of the egress may coincide with any portion of the bottom width.

Alignment System to Control Movement of a Barrel Relative to a Slide

[0158] FIG. **10**A illustrates a cross-sectional view taken across a width of a slide assembly **1000** with an alignment system **1099** to restrict movement of the muzzle end of the barrel **1030** within a plane perpendicular to a bore axis of the barrel **1030** and prevent rotational movement of the barrel **1030** relative to the slide **1020**. The bore axis is the center of a bore extending from a start of the bore to the muzzle end

of the bore (in this view, the bore axis is at a center of the bore of the barrel **1030** going into the page, and the plane coincides with the page).

[0159] The alignment system **1099** includes a groove or protrusion located on the bore length segment of the barrel **1030**. This groove or protrusion mates with a protrusion or groove defined by an interior surface of the slide. In this embodiment, the bore length segment of the barrel **1030** is non-cylindrical, and the alignment system **1099** includes a protrusion on a top of the barrel **1030** (e.g., the pointed top of the non-cylindrical bore length segment). In this embodiment, the protrusion mates with a groove defined by an underside of a top of the slide **1020**. The alignment system **1099** reduces lateral movement of the muzzle end of the barrel **1030** within the plane (e.g., prevents movement of the barrel to the left or right).

[0160] FIG. **10**B illustrates a cross-sectional view taken across a width of the slide assembly of FIG. **10**A. FIG. **10**C illustrates a cross-sectional view taken along line AW of FIG. **10**B. FIG. **10**D illustrates a cross-sectional view taken along line AV of FIG. **10**B. FIG. **10**E illustrates a cross-sectional view taken along line AU of FIG. **10**B. FIGS. **10**C-E illustrate that the slide assembly **1000** provides gas compensation to reduce recoil. In particular, an arch **1021** is shown in FIG. **10**E, and this arch may be similar in any respect to arch **21** (FIG. **2**A).

[0161] The arch **1021** includes a triangular shaped underside, in contrast to the rounded underside of the arch **21** (which does not include the alignment system **1099**). Other examples including of slide assemblies to provide gas compensation to reduce recoil and with an alignment system may have differently shaped arches (for instance, it may be possible and practical to have a protrusion from an underside of the arch to mate with a groove formed on an upper section of a non-cylindrical barrel).

[0162] Also, some embodiments of a slide assembly that do not provide gas compensation to reduce recoil may utilize an alignment system similar to alignment system **1099**. Such an embodiment may not include an arch similar to arch **21** (FIG. **2**A) or arch **1021**. However, an underside of the slide in such an embodiment may include the protrusion or groove on an underside of a front of the slide (e.g., a non-cylindrical opening in the front of the slide to receive a non-cylindrical bore length segment of a barrel). Accordingly, various embodiments of a slide assembly may include gas compensation and/or an alignment system.

Slide Assembly with Optic Mounting Platform

[0163] Pistols may be retrofitted with a red dot sight using an MOS (modular optic system) using a mount bracket located behind the ejection port. FIG. **1**B illustrates a partial top view of a slide with an MOS (modular optic system) cover plate removed. The slide **150** may otherwise be similar to the slide **100** (FIG. **1**A). FIG. **1**C illustrates a bottom view of an MOS adapter plate **151** (the MOS adapter plate is an intermediary interface to couple to an optic adapter mounting interface—other optic adapter mounting interfaces exist). FIG. **1**D illustrates a slide assembly **152** in which the MOS adapter plate **151** of FIG. **1**C is installed on the slide of FIG. **1**B.

[0164] FIG. **1**E illustrates installation of a sealing plate **153** on the slide assembly **152** of FIG. **1**D. The sealing plate **153** may be made out of thin sheet metal. The sealing plate **153** may have a width that is the same as a width of a bottom of an RMR optic **154** (FIG. **1**F illustrates a bottom view of an RMR optic **154**), both of which may be wider than the MOS adapter plate **151** (FIG. **1**C). The sealing plate **153** forms a seal with a face groove seal **156** to prevent moisture from reaching the battery **155**. FIG. **1**G illustrates the RMR optic **154** of FIG. **1**F and the sealing plate **153** of FIG. **1**E installed on the slide assembly of FIG. **1**D.

[0165] FIG. **11**A illustrates top and side views of a slide **1100** including an optic mounting platform **1153** integrally formed on the top of the slide **1100** and a grip for charging the slide integrally formed from sides **1155** below the optic mounting platform **1153**. FIG. **11**B illustrates a partial side view of the slide **1100** of FIG. **11**A. FIG. **11**C illustrates the slide **1100** of FIGS. **11**A-B being charged using the grip that is integrally formed from the sides **1155** below the optic mounting platform **1153**.

[0166] Referring to FIG. **11**A, in this embodiment, the width of the optic mounting platform **1153** corresponds to the width of the RMR optic **154** (FIG. **1**F). FIG. **13** illustrates a partial side view of a slide assembly in which the RMR optic **154** illustrated in FIG. **1**F is mounted directly on the slide **1100**, and in which the sides of the RMR optic **154** align with sides of the optic mounting platform **1153**. Other embodiments may be arranged for use with some other optic, and the sides of the optic mounting platform **1153** align with the sides of the optic.

[0167] Referring again to FIG. **11**A, the RMR optic **154** may mount directly on the optic mounting platform **1153**. The optic mounting platform **1153** includes a smooth surface to form a seal with the face groove seal **156** (FIG. **11**C) of the RMR optic **154** in the case of direct mounting. In some embodiments, a distance between a surface of the optic mounting platform **1153** and the top of the RMR optic **154** may be less than a distance between a top of the slide **150** (FIG. **1**B) and the RMR optic **154**, reducing the height of the firearm assembly.

[0168] In this embodiment, the optic mounting platform **1153** is a recess in a top of the slide **1100**. In particular, material is removed from the top of the slide **1100** to form the surface of the optic mounting platform. In this embodiment, the surface of the optic mounting platform **1153** is lower than a top of the slide **1100** in front and/or behind the optic mounting platform **1153**. As such, a distance between the surface of the optic mounting platform and the top of the RMR optic **154** may be less than a thickness of a stack including the MOS adapter plate **151** (FIG. **1**C) and/or the sealing plate **153** (FIG. **1**E). In other embodiments, the optic mounting platform **1153** may be formed using other techniques besides recessing a top of the slide. Whether or not recessing is used, in various embodiments the surface of the top of the optic mounting platform **1153** may be arranged to be no greater than surfaces of a top of the slide in front and/or behind the optic mounting platform **1153** (e.g., lower than or coplanar with the surfaces of the top of the slide in front and/or behind the optic mounting platform **1153**).

[0169] The sides of the slide **150** (FIG. **1**B) include scalloping to grip the vertical sidewalls of the slide **150** to charge the slide **150**. However, when the slide gets wet and/or if the user does not grip the slide optimally (say, due to an injury), the user's grip may slip before completely charging the slide.

[0170] Referring to FIG. **11**A, the sides **1155** slope inward from an edge of the optic mounting platform **1153** to a lower location on the sides **1155**. This provides an increasing width

of the slide **1100** towards the optic mounting platform **1153**). This increasing width gives the user leverage when gripping the slide **1100** to compensate for non-optimal conditions (e.g., wet equipment, or an injured hand).

[0171] In this embodiment, the inward slope is a continuous linear slope. In other embodiments, the sides **1155** may have a non-linear slope and/or may have varying slopes (for instance two or more slopes may be used to provide an angular surface). In various embodiments, the sides **1155** may have indentions (such as the scalloping of the slide **150** in FIG. **1**B or some other indentation such as the triangular depression shown in FIG. **13**) or bumps, as desired, to optimize the leverage associated with this grip point.

[0172] FIG. **11**D illustrates a back view of a slide assembly in an embodiment in which the exterior sides of the slide are inward sloping from an upper location **1195** below the optic mounting platform **1193** to a lower location below the upper location **1194**. Optic mounting platform **1193** may be similar in any respect to optic mounting platform **1153** (FIG. **11**A).

[0173] In this embodiment, a relief cavity **1199** is created by removing some material from a portion of the inward sloping exterior side. Other examples may not include the relief cavity **1199**. Another embodiment may use a continuous non-linear slope. In yet other embodiments, the exterior sides may include varying slopes (linear slopes, non-linear slopes, or combinations thereof).

[0174] FIG. **11**E illustrates a back view of a slide assembly in another embodiment including an optical mounting platform **1197** overhanging fully vertical exterior surfaces **1192** of sides of the slide. The optical mounting platform **1197** may be similar to optical mounting platform **1193** (FIG. **11**D) in any respect. In this embodiment, an upper portion of the exterior surface of the sides of the slide has two different inward slopes above the fully vertical exterior surface **1192**. In other embodiments, there may be a single continuous slope above fully vertical exterior surfaces **1192** (and this single continuous slope may be linear or non-linear). In other embodiments, there may be no inward sloping (e.g., the sidewall section above fully vertical exterior surfaces **1192** may include only one or more fully horizontal sections and one or more fully vertical sections, e.g., one or more "steps").

Optic Guard

[0175] Referring again to FIG. **11**A, this embodiment of the slide **1100** includes an optic guard mount **1170** in front of the optic mounting platform **1153**. In this embodiment, the optic guard platform **1153** is integrally formed with the slide **1100** (e.g., integrally formed with the top and/or sides **1155** of the slide **1100**). In this embodiment, the optic guard mount **1170** is a channel (e.g., a dovetail groove). A plug **1160** is shown installed in the dovetail groove in FIG. **11**B. In other embodiments, an optic guard mount similar to optic guard mount **1170** may be provided in a firearm assembly that may or may not include the optic mounting platform **1153**.

[0176] Referring to FIG. **12**, an optic guard **1200** is shown installed in the optic guard mount **1170**. The optic guard **1200** includes an integrated bracket **1201** with a first side to mate with the optic guard mount **1170**. In this example, a frame **1205** is integrally formed with the bracket **1201**, but in other examples the bracket **1201** may have a second opposite side to receive the frame **1205** and the frame **1205** may be attached (e.g., welded, removably attached, or the like) to the second side of the bracket **1201**. In this embodiment, the frame **1205** protects a lens of the RMR optic **154**, and a body (such as a housing) of the RMR optic **154** (e.g., the body on the optic mounting platform **1153**). The frame **1205** may protect the top and sides of the body of the RMR optic **154**.

[0177] In this embodiment, the bracket **1201** couples to a firearm assembly independently of the body of the RMR optic **154**. In the present embodiment, the bracket **1201** couples directly to a firearm. In another embodiment, the bracket **1201** (or any other optic guard bracket described herein) may couple to the firearm assembly by piggyback-mounting to an optic that is mounted on the firearm. For example, the firearm assembly may include a long range optic mounted on the firearm and a short range optic mounted on the long range optic, the bracket **1201** may couple to an optic guard mount defined by a component of the long range optic.

[0178] In this embodiment, the optic guard **1200** is arranged to couple to the firearm assembly without contacting the optic and without contacting the body thereof (e.g., in this embodiment —without contacting any part of the RMR optic **154**). A gap between a back of the frame **1205** and the body of the RMR optic **154** is shown. The gap also prevents impact to the optic guard **1200** from transferring energy to the RMR optic **154**—reducing risk of damage to the optic (and also maintaining zero of the sight alignment).

[0179] The RMR optic **154** may be sighted in at a time of installation of the optic guard **1200**. The arrangement of the optic guard mount **1170** may provide for installation without any contact between the optic guard **1200** and, in this example, any part of the RMR optic **154**. For instance, the dovetail groove embodiment of the optic guard mount **1170** allows the optic guard **1200** to be side-installed to maintain zero of the slight alignment of the firearm assembly (no contact with RMR optic **154** during installation).

[0180] In the illustrated embodiment, the frame **1205** is fully-enclosed—it includes a top frame segment, a bottom frame segment, and side frame segments (e.g., four sided). In other examples, a frame of on optics guard may have a fewer or greater number of sides (such as a ring shape) and/or be fully and/or substantially enclosed to protect a top and sides of a body of an optic.

[0181] A front of at least one frame segment of the frame segments may include indentations/bumps forming another grip location for charging the slide (the indentations/bumps may also be provided on other frame members, such as on a top part of the front of the side frame segments). One embodiment of the frame **1205** is similar to the frame of the optic guard bracket shown in FIG. **15** (in which indentations are provided on the frame members of the optic guard bracket illustrated in FIG. **15**). Charging using this grip location may be performed using the palm of the hand, as illustrated in FIG. **14**D. Due to the gap and the depth of the frame **1205**, charging using this grip location may not smudge the optic (and as already mentioned may maintain zero).

[0182] FIG. **13** illustrates a partial side view of an optic guard with an integrated rear sight **1399**. This optic guard may be similar in any respect to optic guard **1200** (FIG. **12**). In this embodiment, the integrated rear sight **1399** is located on a bottom member of the frame of optic guard **1200**. In another embodiment, the integrated rear sight **1399** may be

provided on some other part of the optic guard **1200**. In some embodiments, the integrated rear sight **1399** may be releasably coupled to the optics guard **1200**. The integrated rear sight **1399**, and the charging grip points, are usable regardless of whether the firearm is currently provisioned with an optic or not.

[0183] FIG. **14**A illustrates a side view of an optic guard **1400** usable with the slide **100** and the RMR optic **154** shown in FIG. **1**F. This optic guard **1400** includes a frame **1415** (which may be similar in any respect to the frame **1205** of FIG. **12**). The frame **1415** is fixably attached to a front of a bracket **1410**. Fixable attachment may be welding one or more protrusions on the front of the bracket **1410** or the frame **1415** into mating openings formed on the other of the front of the bracket **1410** and the frame **1415** (e.g., non-releasably attached). FIG. **15** illustrates another embodiment of an optic guard **1500** usable on a legacy slide in which the optic guard **1500** has a fully-enclosed frame fixably attached to a bracket in which the front-most openings **1505** on the bottom of the front of the bracket expose protrusions **1510** extending from the bottom of the frame.

[0184] Referring again to FIG. **14**A, in this embodiment the bracket **1410** is a plate. However, in other embodiments, a bracket need not be a plate (this is shown in FIG. **15**, in which the bracket has a front section that is thicker than a rear section of the bracket).

[0185] Referring again to FIG. **14**A, a surface of the top side of the bracket **1410** may be similar in any respect to the surface of the mounting platform **1153** (FIG. **11**A). The bottom side of the bracket **1410** may be smaller than the top side, and may similar to the bottom of the MOS adapter plate **151** (FIG. **1**C). FIG. **14**B illustrates that the sides **1420** of the bracket **1410** may be sloped, although this is not required.

[0186] FIG. **14**C illustrates a partial side view of a firearm including the optic guard **1400** (FIG. **14**A) with the RMR optic **154** (FIG. **1**F) installed thereon. The gap between the back of the frame of the optic guard **1400** and the front of the body of the RMR optic **154** may be the same as the gap described with respect to FIG. **12**.

[0187] FIG. **14**D illustrates charging a slide using a grip location provided on an optic guard. Charging may be accomplished without bumping the RMR optic **154** and without smudging the optic thereof. This charging grip point does not require the use of fingers/thumb (the scalloped grip on the side of the slide **100** of FIG. **1**A is gripped using a finger and thumb). This charging grip point may be gripped using the palm instead, allowing the slide to be optimally charged (e.g., charged without smudging the optic and/or without bumping the RMR optic **154**)—even in the case of an injury to the finger or thumb.

[0188] Referring again to FIG. **15**, this optic guard **1500** with integrated bracket may be utilized with a different legacy slide than the legacy slide **100** of FIG. **1**A. The underside of the bracket is arranged for attaching to a top exterior surface of the legacy slide. The top surface of the bracket (not shown) may be similar in any respect to the top surface of the mounting platform **1153** (FIG. **11**A).

[0189] Having described and illustrated various examples herein, it should be apparent that other examples may be modified in arrangement and detail, e.g.:

[0190] Any slide assembly described herein may be arranged to include any optic mounting platform described herein and/or arranged to include any optic guard mount described herein, according to various embodiments. Any slide assembly described herein may be arranged to include any alignment system described herein, according to various embodiments. Any slide assembly described herein may be arranged to retrofit a firearm having a slide assembly or may be part of original equipment of a firearm, according to various embodiments.

[0191] The optic guards and the optic guard brackets described herein may be arranged to interoperate with any slide assembly described herein, or some other slide assembly currently known or later developed, according to various embodiments.

Compensator System with Mounted Gas Port Device

[0192] Known compensators may thread onto an end of a barrel. These compensators may be arranged to receive gas exiting a muzzle of a barrel, such as from the muzzle **2** of the barrel **105** of FIG. **1**A. These compensators provide gas recoil by redirecting a portion of the received gas from the muzzle **2** in a particular direction.

[0193] FIGS. **17**A and **17**B show an exploded view and an isometric view, respectively, of a compensator system **1700**. In the compensator system **1700**, the barrel **1711** may include an egress **1739** that may be similar to barrel egress **39** (FIG. **3**) or any other barrel egress described herein. The compensator system **1700** may include a gas port device **1710** with an opening **1723** to expose the egress **1739** when the gas port device **1710** is mounted on a part of the barrel **1711** that protrudes from the slide **1705**. The opening **1723** and the egress **1739** may form a gas port **1749** similar in any respect to the gas port **49** (FIG. **4**A).

[0194] In contrast to compensators that receive all the gas from the muzzle of the barrel, the gas port device **1710** may receive the gas from the egress **1739** of the barrel **1711**. The total length of the compensator system **1700** may be shorter than the total length of a barrel and a compensator in which the compensator threads onto the barrel and/or receives all the gas from a muzzle of a barrel.

[0195] The slide **1705** may be similar to the slide **100** in any respect. In various embodiments, the slide **1705** may have a front wall **1712** similar to the front wall illustrated in FIG. **1** (the front wall corresponding to the front interior wall **12** of slide **100**). The egress **1739** may be located on a part of the barrel **1711** that protrudes from a bore **1713** in the front wall **1712**, e.g., interior walls of the gas port **1749** may be different/separate than the front wall **1712** with the bore **1713**.

[0196] The gas port device **1710** may be mounted to the barrel **1711** using any fasteners or other attachment device now known or later developed. In this example, the gas port device **1710** is mounted to the barrel **1711** using a taper pin **1720**, which will be described in more detail later with respect to the description of FIG. **17**F.

[0197] During the firing cycle, the barrel **1711** may lock up with the slide **1705** in a similar way that barrel **105** (FIG. **1**) locks up with slide **100** (FIG. **1**). Specifically, the bore **1713** defined by the front wall **1712** may have standard dimensions as a bore on "stock" slide. In the case of a glock-compatible firearm (which allows the muzzle end of the barrel to move upwards with respect to the slide during the firing cycle), the bore **1713** may be an eccentric bore. Due to this, unlike some other compensator assemblies that may not operate with standard-dimensioned slide, the compen-

sator system **1700** is operable with slide **100** or any other slide with a front wall **1712** similar to the front wall of slide **100**.

[0198] In some embodiments, compensator system **1700** may provide some recoil reduction even when gas port device **1710** is not mounted to the barrel **1711**. Specifically, even when the firearm is fired without the gas port device **1710** attached, the egress **1739** may provide some base amount of recoil reduction (due to the gas venting from the egress **1739** to direct the gas in a direction that reduces recoil).

[0199] FIGS. **17**C, **17**D, and **17**E illustrate a top view, a side view, and a front view, respectively, of the compensator system **1700**. FIG. **17**F illustrates a section view of the compensator system **1700** taken along section line C. The taper pin **1720** may interface with a taper interface **1721** provided on a bottom of the barrel **1711** (FIG. **17**A). FIG. **17**G illustrates the taper pin **1720** in more detail. In this example, it includes a taper lock interface **1722** along part of its length (another part of the length includes threads as illustrated).

[0200] The taper interface **1721** is shown in more detail in FIGS. **18**A-C. FIGS. **18**A and **18**B illustrate a top view and a side view, respectively, of the barrel **1711**. FIG. **18**C illustrates a section view of the barrel **1711** (taken along section line E). In this example, the taper interface **1721** is a tapered "V" slot **1721**. In other examples, a different slot may be provided, such as a rounded slot.

[0201] Referring again to FIG. **17**F, the part of the barrel **1711** on which the gas port device **1710** (FIG. **17**A) is mounted may include indexing flats **1730** to mate with a corresponding indexing flats of the gas port device **1710**. FIG. **19** illustrates a rear view of the gas port device **1710**, which shows an opening **1929** in the gas port device **1710**. The opening **1929** defines indexing flats **1930** to mate with the indexing flats **1730** (FIG. **17**F). Referring again to FIG. **17**F, when the taper pin **1720** is tightened (e.g., using a wrench tool in this example), the taper lock interface **1722** (FIG. **17**G) contacts the corresponding taper interface **1721** of the bottom of the barrel **1711**. In this example, the taper pin **1720** includes threading to interface with an internal thread in the gas port device **1710**; however, this is not required. In other examples, a taper pin may not include threads—it could be driven into the hole in the gas port device **1710** to lockup with the taper lock interface **1721** provided in the bottom of the barrel **1711**.

[0202] The location of the indexing flats of the barrel (and the indexing flats of the barrel) may be on any position around the barrel, such as either side the barrel, the top of the barrel, the bottom of the barrel, or any other orientation between those. In other examples, some other indexing face may be used that is different than the illustrated indexing flats (a curved profile, etc.) In this example, the timing system includes plural indexing faces, but in other examples it may possible and practical to use a single indexing face on the barrel **1711** and on the gas port device **1710**.

[0203] Referring again to FIG. **17**G, in this example the taper pin **1720** includes four sections: a threaded section, a tapered section, and a straight section proximate to each end. As the taper pin starts to engage the taper interface **1721** (FIG. **17**F) the straight sections may prevent the taper pin **1720** from being urged away from the barrel **1711** (FIG. **17**F). Specifically, the gas port device **1710** may be arranged with a hole of a corresponding diameter that the small diameter straight section fits into and a counter bore with a corresponding diameter that the large diameter straight section fits into (this can be seen in FIG. **17**F). The taper pin **1720** may be held into place on both sides of the taper lock interface **1722** by these straight sections to keep either end of the taper pin **1720** from moving away from the barrel.

[0204] In other embodiments, the taper pin may not require the straight sections proximate to each end. FIG. **24**A-C illustrate an example without these straight sections proximate to each end of the taper pin **2420**. A taper pin may include a single continuous taper with a first region having a taper lock interface to contact a taper interface of a barrel and a second region to contact the barrel-mountable accessory. In other embodiments, a taper pin may have two distinct sections—a tapered first section to contact a taper interface of a barrel and a second non-tapered (or differently tapered) section to contact the barrel-mountable accessory (this is illustrated in the embodiment of FIGS. **24**A-D— in this example a tapered section is between the a threaded section and the driving end of the taper pin **2420**).

[0205] FIG. **20**A illustrates a barrel **2011** that may be similar in any respect to barrel **1711** (FIGS. **18**A-B). FIG. **20**B is a detail K showing an interface with a round taper profile (instead of a tapered "V" slot). An interface on a bottom of the barrel may have a V profile, a round profile, or any other profile, according to various embodiments. The location of the interface of the barrel (and the taper lock interface) may be on any position around the barrel, such as either side the barrel, the top of the barrel, the bottom of the barrel, or any other orientation between those.

[0206] FIGS. **21**A, **21**B, **21**C, and **21**D show an exploded view, an isometric view, a top view, and a side view, respectively, of another compensator system **2100** utilizing a dual-ported gas port device **2110**. All other components of the compensator system **2100** may be the same as the compensator system **1700** (FIG. **17**A). FIG. **21**E shows a view taken from the perspective of the arrows of line H of FIG. **21**D.

[0207] Gas port device **2110** may receive gas from a barrel egress similar to gas port device **1710** (FIG. **17**A), but also may receive additional gas from the muzzle of the barrel. Accordingly, gas port device **2110** may provide additional recoil reduction. A user may interchangeably mount gas port devices **1710** and **2110** on a same barrel (or run with no gas port device attached for base recoil reduction), depending on a desired amount of recoil reduction. FIG. **21**F shows an isometric view of the slide-facing side of gas port device **2110**.

[0208] Although the various above-described embodiments of a compensator system with mounted gas port device feature a non-threaded barrel, it should be appreciated that any of the features included in those compensator systems may be utilized in a compensator system with a threaded barrel. FIGS. **22**A-**24**E illustrate examples in which threaded barrels are used. FIGS. **22**A, **22**B, **22**C, **22**D, and **22**E show an exploded view, an isometric view, a top view, and a front view, and a cross-sectional side view, respectively, of another compensator system **2200** with a threaded barrel **2211**. FIG. **23** shows a side view of a threaded barrel-mounted accessory **2305** installed on the threaded barrel **2211** of the compensator system **2200** of FIGS. **22**A-E. FIGS. **24**A-D show an exploded view, an isometric view, a front view, and a cross-sectional side view of another compensator system **2400** with a threaded barrel **2411**.

[0209] Referring to FIG. **22**A, in the compensator system **2200**, the barrel **2211** may include an egress **2239** that may be similar to barrel egress **39** (FIG. **3**) or any other barrel egress described herein. The compensator system **2200** may include a gas port device **2210** with an opening **2223** to expose the egress **2239** when the gas port device **2210** is mounted on a part of the barrel **2211** that protrudes from the slide **2205**. The opening **2223** and the egress **2239** may form a gas port **2249** similar in any respect to the gas port **49** (FIG. **4**A).

[0210] In contrast to compensators that receive all the gas from the muzzle of the barrel, the gas port device **2210** may receive the gas from the egress **2239** of the barrel **2211**. The total length of the compensator system **2200** may be shorter than the total length of a barrel and a compensator in which the compensator threads onto the barrel to receive all the gas from the muzzle of a barrel.

[0211] The slide **2205** may be similar to the slide **100** in any respect. In various embodiments, the slide **2205** may have a front wall **2212** similar to the front wall illustrated in FIG. **1** (the front wall corresponding to the front interior wall **12** of slide **100**). The egress **2239** may be located on a part of the barrel **2211** that protrudes from a bore **2213** in the front wall **2212**, e.g., interior walls of the gas port **2249** (FIG. **22**B) may be different/separate than the front wall **2212** with the bore **2213**.

[0212] In this embodiment, the part of the barrel **2211** that protrudes from the bore **2213** in the front wall **2212** is threaded. The gas port device **2210** (which has corresponding threading to mate with the threading on the part of the barrel **2211**) may be mounted to the barrel **2211** using this threading and the taper pin **2220**, which may be similar in any respect to the taper pin **1720** described with respect to FIG. **17**F.

[0213] Referring now to FIG. **22**E, when the taper pin **2220** is tightened (e.g., using a wrench tool in this example), the taper locker interface **2222** (FIG. **22**A) contacts the corresponding taper interface **2221** of the bottom of the barrel **2211**. In this example, the taper pin **2220** includes threading to interface with an internal thread of the gas port device **2210**; however, this is not required. In other examples, a taper pin may not include threads—it could be driven into the hole in the gas port device **2210** to lockup with the taper lock interface **2221** in the bottom of the barrel **2211**.

[0214] Referring now to FIG. **23**, a different barrel-mounted accessory may be mounted to the barrel **2211** (in place of the gas port device **2210** and the taper pin **2220**). In this example, a known suppressor **2305** is shown. The threading on the barrel **2211** (FIG. **22**A) may be arranged to mate with threading on the known suppressor **2305**. The taper lock interface **2221** (FIG. **22**E) may not contact the threading on the known suppressor **2305**. In this way, the barrel **2211** (FIG. **22**A) with the taper lock interface **2221** can be used with any known barrel-mounted accessories that are not arranged with taper lock interface features.

[0215] Referring again to FIG. **22**E, it should be appreciated that the location of the taper interface **2221** on the barrel **2211** (FIG. **22**A) may be variously located at any position on the barrel **2211**. In some examples, the taper interface **2221** may be located on the side of the barrel **2211**, instead on the bottom of the barrel **2211**, for instance.

[0216] Additionally, although the taper pin **2220** (FIG. **22**A) is side-mounted (e.g., arranged perpendicular to the barrel **2211**) in this embodiment, other mountings of a taper pin are possible and practical. FIGS. **24**A-D illustrated embodiment of a compensator system **2400** that may be similar in any respect to compensator system **2200** (or any other compensator system described herein) with a differently-oriented taper pin **2420** (e.g., not side-mounted and not perpendicular to the barrel **2411**—this taper pin **2420** is mounted parallel to the barrel **2411** from the front end of the barrel **2411**). Besides the different taper interface **2421**, the barrel **2411** may otherwise be similar to the barrel **2211** (FIG. **22**A) in any respect.

[0217] The taper interface **2421** in this example is a notch sloping downwardly looking from the front of the barrel (in contrast to the taper interface **2221** that is side sloping looking from the front of the barrel). The use of the notch on the taper interface **2421** (or any other taper interface described herein) is not required. In other examples, the taper interface **2421** may have a groove shape (such as a V-groove in which the V-shape can be seen looking from the front of the barrel **2211**).

[0218] The gas port device **2410** may have an opening on a front end to receive the taper pin **2420** (rather than an opening on a side), but otherwise may be similar to the gas port device **2210** (FIG. **22**A). FIG. **24**C shows a front view in which the head of the taper pin **2420** is shown below the muzzle end of the barrel **2411**.

[0219] The taper locker interface **2422** of the taper pin **2420** is shown in FIG. **24**D. The taper lock interface **2422** contacts the corresponding taper interface **2421** (FIG. **24**A) of the bottom of the barrel **2211** (FIG. **24**A). FIG. **24**D shows that, in this embodiment, the taper lock interface **2422** is behind the threading of the taper pin **2420** (as compared to in front of the threading of the taper pin **2220** of FIG. **22**A). The taper pin **2420** is also differently shaped than the taper pin **2220** of FIG. **22**A, as illustrated in FIG. **24**D.

[0220] In any compensator system described herein, the gas port device may include a sight tracker similar to the sight tracker **1699** (FIG. **16**A-B). In any compensator system described herein, any barrel interior features described herein may be utilized in the barrel (including the barrel interior features described in reference to FIGS. **7**A-**9**C).

[0221] Some embodiments include a retrofit assembly for a firearm, the retrofit assembly to provide the firearm with gas compensation to reduce recoil, the retrofit assembly comprising: a barrel having a muzzle end, a breech end, and a length having a first segment that includes the muzzle end of the barrel and a second segment that includes the breech end of the barrel, wherein an upper region of the first segment of the length of the barrel includes an egress for gas propelled from a chamber of a bore of the barrel; a slide around the second segment of the length of the barrel, wherein the slide has a front wall defining a bore, and wherein the first segment of the length of the barrel protrudes from the bore of the front wall of the slide; and a gas port device mounted to the first segment of the length of the barrel, wherein the gas port device defines an opening to expose the egress of the first segment of the length of the barrel. The firearm may be a Glock compatible firearm, or some other firearm. The bore in the front wall of the slide may be an eccentric bore (in the case of a Glock compatible firearm), or some other circular shape depending on the firearm.

Barrel-Mounted Accessory Taper Lock Interface

[0222] Various features of the taper lock interface described with respect to FIG. **17**F can be applied to any compensator (or other barrel-mounted accessory), including compensators that receive gas only from a muzzle of a barrel. Known compensators may require a threaded barrel. One problem with a threaded barrel is that a compensator may become loose due to vibrations of repeated firing cycles. One embodiment of a compensator with a taper locker interface includes a compensator mountable to a part of a barrel that protrudes from the front wall of the slide. This barrel may not include the egress **1739** (FIG. **17**A) and/or may not be ported. The compensator may be arranged to redirect gas exiting from a muzzle of a barrel.

[0223] In this embodiment, the compensator may include a taper lock interface similar to taper interface **1721** of FIG. **17**F. The compensator may include a taper pin similar to any taper pin described herein.

[0224] In some embodiments, the compensator may also include an opening similar to opening **1929** (FIG. **19**), which may define indexing flats (similar to indexing flats **1930**) to mate with indexing flats on the protruding part of the barrel; however, this is not required. In other embodiments, the compensator may be arranged to mount onto, say, a round barrel (wherein the barrel does not include indexing flats).

[0225] In any embodiment of a compensator with any of the taper lock interface features described with respect to FIG. **17**F (e.g., the taper pin and optionally the indexing flats), the taper lock interface may precisely time the compensator on the barrel when the compensator is mounted on the barrel. This allows the compensator to be identically mounted to the barrel in a repeatable fashion. If the compensator includes a sight tracker, the sight tracker will maintain zero through removal/reattachment of the compensator on the barrel (a user may not need to re-sight the sight tracker after re-mounting the compensator).

[0226] Also, in known compensators, such as threaded compensators that receive gas from the muzzle of the barrel, the bore of the compensator has to be relatively large (compared to the bore of the barrel) so that a bullet cannot hit the compensator when that bullet exits the muzzle. However, this relatively large compensator bore limits the amount of recoil reduction the compensator can provide (because a lower volume of gas can be directed because of the relatively large compensator bore). In contrast, since a compensator using a taper lock interface as described herein can be mounted identically in a repeatable fashion, the bore of the compensator can be closer in size to the bore of the barrel. Therefore, the use of the taper lock interface allows further optimization of gas flow for improved recoil reduction compared to compensators that thread onto threaded barrels.

[0227] A compensator with a taper lock interface may have a lower region that is shorter than an upper region of the compensator—to mate with a barrel having a sloped muzzle end similar to the sloped muzzle end of the barrel **1711** of FIG. **17**A. This is due to the small profile of the taper lock interface on the bottom of the barrel. This may minimize the impact of the compensator increasing the length of the firearm (this wedge profile may allow the firearm to be holstered more easily than firearms with compensators that have a lower region that is the same length as the upper region of the compensator).

[0228] In the embodiments described above, the barrel-mounted accessory is a compensator. However, the taper lock interface may be used for any barrel-mounted accessories, including accessories to adapt a barrel to a silencer/suppressor (such as a recoil booster—also known as a Nielsen device) or any other barrel-mounted accessory.

[0229] Although the various above-described embodiments of barrel-mounted accessories with taper lock interfaces feature non-threaded barrels, it should be appreciated that any of the features included in those embodiments may be utilized in a firearm assembly or firearm with a threaded barrel. FIGS. **22**A-**24**D illustrate embodiments in which the barrel-mounted accessory is a gas port device, but any of the features described with respect to FIGS. **22**A-**24**D may be used in a threaded barrel without the egress and/or with any barrel-mounted accessories.

[0230] In various embodiments described herein, the tapered section of the pin has a conical surface. However, in other embodiments the tapered section of the pin may have non-conical surfaces such as multiple faces (e.g., flat faces or curved faces with vertexes between the faces). The taper interface on the barrel may have one or more corresponding flat or curved faces.

Barrel-Mounted Accessory with Timing System

[0231] Various features of the timing system described with reference to FIGS. **17**F and **19**, e.g., the indexing flats **1730** and **1930**, may be used in a compensator (or some other barrel-mounted accessory) with any attachment interface that is now known or later developed (e.g. not limited to the taper lock interface). For instance, the bottom of the compensator (e.g., an apex of the bottom of the compensator) may have a threaded hole to receive a threaded screw. When the screw is tightened, the indexing flats are pressed together. Other mechanisms for pressing the indexing flats together may be used in other examples.

[0232] The indexing flats may precisely time the compensator on the barrel when the compensator is mounted on the barrel. This allows the compensator to be identically mounted to the barrel in a repeatable fashion. If the compensator includes a sight tracker, the sight tracker will maintain zero through removal/reattachment of the compensator on the barrel (a user may not need to re-sight the sight tracker after re-mounting the compensator).

[0233] Also, in known compensators, such as threaded compensators that receive gas from the muzzle of the barrel, the bore of the compensator has to be relatively large (compared to the bore of the barrel) so that a bullet cannot hit the compensator when that bullet exits the muzzle. However, this relatively large compensator bore limits the amount of recoil reduction the compensator can provide (because a lower volume of gas can be directed because of the relatively large compensator bore). In contrast, since a compensator using indexing flats as described herein can be mounted identically in a repeatable fashion, the bore of the compensator can be closer in size to the bore of the barrel. Therefore, the use of the indexing flats allows further optimization of gas flow for improved recoil reduction compared to compensators that thread onto threaded barrels.

[0234] In the embodiments described above, the barrel-mounted accessory is a compensator with the barrel egress. However, it should be appreciated that the timing system may be used for any barrel-mounted accessories, including compensators without the barrel egress, accessories to adapt

a barrel to a silencer/suppressor (such as a recoil booster), or any other barrel-mounted accessory.

[0235] In the embodiments described above, the barrel-mounted accessory is a compensator with the barrel egress. However, it should be appreciated that the taper lock interface may be used for any barrel-mounted accessories, including compensators without the barrel egress, accessories to adapt a barrel to a silencer/suppressor (such as a recoil booster), or any other barrel-mounted accessory.

[0236] In one embodiment in which the taper lock interface is used with a compensator without a barrel egress, the muzzle end of the barrel may have the same features as barrel **2211** (FIG. **22**A)—excluding the egress **2239**. This barrel may be compatible with a known threaded compensator that may receive gas from the muzzle end of the barrel, as well as with barrel-mounted accessories having a taper lock interface.

[0237] In one embodiment, a barrel-mounted "adapter"—to allow a non-threaded barrel to operate with threaded accessories—is provided. The non-threaded barrel may have the same features as barrel **1711** (FIG. **17**A)—excluding the egress **1739**. The adapter may have a back and side similar to the back and side of gas port device **1710** (or some other taper lock interface features described herein). The front of the adapter may have a threaded barrel-shaped projection similar to the muzzle end of barrel **2211** (FIG. **22**A)—excluding the taper lock interface **1721**. Therefore, the adapter with the taper lock interface on its back side may adapt the non-threaded barrel to receive a known threaded barrel-mountable accessory (such as a known threaded suppressor) on the adapter's front side.

[0238] In the embodiments illustrated here, the taper lock interface is used for a barrel-mounted accessory on a pistol. However, the taper lock interface may be used for barrel-mounting an accessory (such as a suppressor) to any firearm, including rifles or other long guns.

Adapter Assembly for Firearm Optic

[0239] The design of the MOS adapter plate **151** (FIG. **1**C) requires very tight tolerances during installation. Users may use any available screw, but these may be too long, and may cause the MOS adapter plate **151** to pull away from the slide **150** (FIG. **1**B) once they are tightened down (leaving a gap and/or bending the MOS adapter plate **151**). Even when the user acquires the correct screws, there are still issues with alignment and/or catching a chamfered screw tip and/or threading to complete the installation.

[0240] FIG. **25**A shows an isometric view showing a top of an adapter assembly **2500** for a firearm optic, according to various embodiments. FIG. **25**B illustrates an isometric view showing a bottom of the adapter assembly **2500** of FIG. **25**A. FIG. **25**C illustrates an isometric view illustrating how the adapter assembly **2500** of FIG. **25**A is used with the firearm optic **2570**.

[0241] The illustrated fasteners **2561** (e.g., a bottom-up bolts) include a sheer-resistant section **2564** between the head **2563** and the threading **2565**. In this embodiment, the sheer-resistant section **2564** has a diameter that is different than a diameter of the threading **2565** (e.g., greater than a minor diameter of the threading **2565**).

[0242] In this embodiment, the sheer-resistant section **2564** a single part (monolithic, not interconnected parts) that is solid and extending from at least the top surface of the bracket **2551** to a top of the firearm optic **2570**. Although this column may be cylindrically shaped as shown (with a circular cross section and corresponding sidewall), in other embodiments a solid column may have faceted sidewalls (and have a hexagonal cross section, a square section, or some other cross section).

[0243] The sheer-resistant section **2564** may also be threadless. This may prevent sheer forces generated by operational forces (e.g., firing, or gripping the firearm optic **2570** to charge the firearm), or other forces such as an impact to the firearm optic or a guard thereof, from damaging and/or wearing the adapter assembly **2500**. This may also simplify release and re-attachment of the firearm optic **2570** or the adapter assembly **2500** from the firearm without premature wearing of the adapter assembly **2500**.

[0244] In this embodiment, the fasteners **2561** are bottom-up bolts and the sheer-resistant section **2564** is a shank of the bottom-up bolts. A bolt, of course, is a fastener with threads and a nut, in which the fastener does not hold itself into a material and relies on the nut to provide holding tension. In contrast, a screw, of course, holds into the material by being tightened into its hole. The use of a screw to couple an adapter assembly to a firearm may require tight tolerances to sufficiently tighten the screws into their holes without damaging the adapter assembly (e.g., bending the adapter) or without leaving any gap between a bottom of a firearm optic and a top surface of the adapter.

[0245] A bottom of the bracket **2551** includes pockets **2554** arranged to mate with the heads **2563** of the fasteners **2561**. FIG. **25**B illustrates a continuous surface formed from the flat of the head **2563** and the bottom surface of the bracket **2551**, due to the mating fit. The pockets **2554** may be keyed to fix a rotational position of the fasteners **2561** when the heads **2563** are in the pockets **2554**. In other embodiments, some other part of the fastener **2561** may be keyed to prevent rotation of the fastener **2561** (for example, a faceted shank could be used, in one embodiment).

[0246] A through opening **2553** extends from a bottom **2569** of the pocket **2554** to the top side of the bracket **2551**. In this embodiment, the through opening **2253** receives part of shank **2564**, but in other examples the through opening **2253** may receive a different part of the fastener **2561** (this will be discussed later in greater detail with respect to the fastener **2961** of FIG. **29**C).

[0247] The top side of the bracket **2551** includes fastener openings **2558** to receive a fastener (not shown) that secures the bracket **2551** to a firearm assembly (not shown, e.g. slide **150**, FIG. **1**B). These fasteners (not shown) may be any fastener, now known (such as a screw) or later developed. The fastener openings **2558** include counter openings **2559** (e.g., counter sinks or counter bores) for the fasteners that secure the bracket **2551** to the firearm assembly.

[0248] Unlike the adapter plate **151** (FIG. **1**C) in which all the fastener heads are on a same side of the adapter plate **151**, the heads **2563** of fasteners **2561** are located on a different side of the bracket **2551** as the heads of the fasteners (not shown) for attaching the bracket **2551** to the firearm assembly (e.g., any slide described herein). Nevertheless, this design may still be backward compatible with known slides (e.g., slide **150**, FIG. **1**B), and known firearm optics (e.g., RMR optic **154**, FIG. **1**F). Installation may be by first fastening the bracket **2551** to the slide (in which the heads of fasteners **2561** are sandwiched between the slide and the bottom of the bracket **2551**, in the pocket **2569**). Once the bracket **2551** is fastened to the slide with these

bolts **2561** upright, the firearm optic **2570** may be mounted on the fasteners **2561** and tightened down using nuts **2575** (e.g., the tapered torx nuts illustrated in FIG. **25**A-C).

[0249] The bracket **2551** may also include registration pins **2552** to mate with registration holes **2572** on the bottom of the firearm optic **2570**. In this embodiment, the registration pins **2552** are integrally formed on the bracket **2551**, but in other examples registration pins may be separate parts that are fixably attached to the top side of the bracket **2551**.

[0250] FIG. **26**A illustrates an isometric view showing a bottom of the adapter assembly **2500** of FIG. **25**A with the firearm optic **2570** installed thereon. FIG. **26**B illustrates a top view of the adapter assembly **2500** with the firearm optic **2570** installed thereon. FIG. **26**C illustrates a rear view of the adapter assembly **2500** with the firearm optic **2570** installed thereon along section line Z of FIG. **26**B.

[0251] FIG. **27**A shows an isometric view showing a top of an adapter assembly **2700** with an integrated optic guard **2705** for a firearm optic, according to various embodiments. FIGS. **27**B-C illustrate an isometric view top and bottom views, respectively, illustrating a slide-on installation of the firearm optic **2770** on the adapter assembly **2700** of FIG. **27**A. In this example, the firearm optic **2770** is side-installed to accommodate the integrated optic guard **2705** of the bracket **2751**. Similar to the other bracket **2551** (FIG. **25**A), first the bracket **2751** is installed on the slide. The fasteners **2761** are movable along an axis relative to the bracket **2751** (before the nuts **2775** are tightened), as shown, which allows the firearm optic **2770** to loosely attach in the offset position shown in FIGS. **27**B-C.

[0252] The firearm optic **2770** is then slide on from the side from the position shown in FIGS. **27**B-C to the position shown in FIGS. **28**A-C. FIG. **28**A illustrates an isometric view showing a bottom of the adapter assembly **2700** of FIG. **27**A with the firearm optic **2770** installed thereon. FIG. **28**B illustrates a top view of the adapter assembly **2700** with the firearm optic **2770** installed thereon. FIG. **28**C illustrates a rear view of the adapter assembly **2700** with the firearm optic **2770** installed thereon along section line Y of FIG. **26**B. In this position, the nuts **2775** are fully tightened down.

[0253] Referring again to FIG. **27**A, differently shaped through openings **2753**A and **2753**B are shown. These through openings **2753**A and **2753**B are different than through opening **2753** (FIG. **25**A), and are arranged to allow movement of the fasteners **2761**A and **2761**B along an axis perpendicular to a center axis of the fasteners **2761**A and **2761**B (e.g., side to side movement) relative to the bracket **2751**, as shown. Also, while through opening **2753**A is fully enclosed by the bracket **2751**, through opening **2753**B is not.

[0254] Referring now to FIG. **27**C, differently shaped pockets **2769**A and **2769**B are shown. These pockets **2769**A and **2769**B are different than through pockets **2553** (FIG. **25**A), and are arranged to allow movement of the fasteners **2761**A and **2761**B along an axis perpendicular to a center axis of the fasteners **2761**A and **2761**B (e.g., side to side movement) relative to the bracket **2751**, as shown, to allow side installation.

[0255] Referring to FIGS. **27**A and **27**B, one edge of the head **2763** of fastener **2761**B may be sloped to form a continuous edge with a corresponding edge of the bracket **2751**. This continuous edge may keep debris from entering between the bracket **2751** and the firearm assembly it is installed thereon. FIG. **28**A illustrates the continuous edge.

[0256] The other fastener **2761**A may be the same shape and/or dimensions as the fastener **2571** (FIG. **25**A). Having the same size and dimensions of this part may simplify a supply chain for a bracket **2751** with the optic guard **2705** and the bracket **2551** (FIG. **25**A).

[0257] Side-installation as shown and described may be desirable for using a stiff monolithic optic guard and adapter plate combination (in which the optic guard is part of a same unitary piece of metal as the adapter plate) and the firearm optic **2770**. Unlike some optic guards that may have a multi-piece construction and/or include polymer, the illustrated stiff monolithic optic guard and adapter plate combination may be formed from a single piece of metal. In other examples, if a firearm optic has a vertical front, a corresponding vertical optic guard may not need side installation. Also, if an optic guard is detachable (for installation after installing the firearm optic), then side installation may not be needed.

[0258] This side installed bracket **2751** may be used with a stock slide or any other slide that is interchangeable with the stock slide. This side installed bracket **2751** may be used with any optics, now known (e.g., is backwards compatible) or later developed.

[0259] FIG. **29**A shows a bottom of another bracket **2951** for a firearm optic, according to various embodiments. FIG. **29**B shows a top view of the bracket **2951** of FIG. **29**A. FIG. **29**C shows an isometric view of a fastener **2961** receivable by the bottom of the bracket **2951** of FIG. **29**A. FIG. **29**D shows a bottom view of the bracket **2951** of FIGS. **29**A-B having the fasteners **2961** inserted therein, according to various embodiments. FIG. **29**E shows a top view of the bracket **2951** of FIG. **29**D.

[0260] The fastener **2961** (FIG. **29**C) includes threading **2965**, a shank **2964**, and a head **2963**. The threading **2965** may be similar in all respects to threading **2565** of FIG. **25**A. The head **2963** includes a section arranged to mate with the pockets **2954** and an intermediate timing boss arranged to mate with the through openings **2953**. The intermediate timing boss prevents rotation of the fastener **2961** when the intermediate timing boss is in the through opening **2953**.

[0261] Referring again to FIG. **29**A, the through opening **2953** located in a bottom **2969** of the pocket **2954** has an obround shaped cross section to key to the intermediate timing boss. In other examples, any keying configuration, now known or later developed, may be used for the through opening **2953**. Whereas the through opening **2553** (FIG. **25**A) receives the shank **2564**, the through opening **2553** receives the intermediate timing boss—this is shown in more detail in FIG. **29**D. The pockets **2964** are cylindrically shaped, to mate with a cylindrically shaped part of the head **2963** of the fastener **2961**.

[0262] Referring now to FIG. **29**B, the top side of the bracket **2951** includes fastener openings **2958** and counter openings **2959** that may be similar in any respect to the fastener openings **2558** (FIG. **25**A) and counter openings **2559** (FIG. **25**A). The registration pins **2952** may be similar in any respect to registration pins **2552** (FIG. **25**A).

[0263] This design may be backward compatible with known slides (e.g., slide **150**, FIG. **1**B), and known firearm optics (e.g., RMR optic **154**, FIG. **1**F). Installation may be by first fastening the bracket **2951** to the slide (in which the heads **2963** of the fasteners **2961** are sandwiched between the slide and the bottom of the bracket **2910**, in the pockets **2954**. Once the bracket **2951** is fastened to the slide with

these fasteners **2961** upright, the optic may be mounted on the upright fasteners **2961** and tightened down using any nuts described herein.

[0264] In another embodiment of an adapter assembly with an optic guard similar to the optic guard illustrated in FIGS. **27**A-C (e.g., a bracket with a frame), the pockets may be similar to in shape to pockets **2954**, but enlarged. The through openings may be similar to through openings **2953**, but rotated 90 degrees. A fastener may be similar to fastener **2961** (FIG. **29**C), but may have an obround top section of the head to allow side-to-side movement of this part of the head in the enlarged pocket. The enlarged pockets and rotated through openings **2953** may be arranged to allow side installation of a firearm optic behind the frame.

[0265] Any of the adapter assembly features described herein may be used in combination with any optic guard and/or slide described herein, such as those illustrated in FIG. **12**. Any of the adapter assembly features may be used with any optics (such as firearm optics illustrated herein or other firearm optics, such as a known long range optic packaged in a scope tube body for, say, a rifle), now known (e.g., is backwards compatible) or later developed. In various embodiments, the bracket **2551** may be used with a stock slide or any other slide that is interchangeable with the stock slide.

[0266] FIG. **30**A shows an isometric view of a slide assembly **3000** for a firearm, according to various embodiments. The slide assembly **3000** includes an adapter assembly including the bracket **3051** and the firearm optic **3070** (which may be similar to any firearm optic described herein). In this embodiment, an optic guard **3005** may cover the front of the body of firearm optic **3070** as illustrated; however, the optic guard **3005** is an optional feature.

[0267] In this embodiment, the firearm optic **3070** is attached to the bracket **3051** using low-profile bolt fastening. The advantages of using bolt fastening for a firearm optic to a bracket are previously described herein—in low-profile bolt fastening embodiment a top of the nuts are out of view when a user looks down the optic (this is illustrated in FIG. **30**F).

[0268] Referring again to FIG. **30**A, the low-profile bolt fastening uses a bolt **3064**, which may have a length that is shorter than a length of the bolt **2561** (FIG. **25**A). This bolt **3064** may have a head similar to any bolt head described herein (e.g., corresponding pockets and through openings, not shown, on a bottom of the bracket **3051** may be similar to pockets and through openings previously described herein). The shank **3080** of the bolt **3064** may be entirely threaded, or may include a non-threaded section (which may be shorter than the non-threaded section of the bolt **2461** of FIG. **25**BA). The sleeve nuts **3075** (which may be alternatively referred to as skirt nuts, barrel nuts, sex bolt nuts), or the like) couple to the bolts **3064**.

[0269] Referring now to FIGS. **30**B-D, the sleeve nut **3075** may have an internal driving mechanism **3076** (in contrast to some other nuts that have an external driving mechanism such as a solid hexagonal head). The sleeve nut **3075** includes a sleeve **3077** with a threaded interior to mate with the threading on the shank of the bolt **3064**. A length of the sleeve **3077** may be arranged so that a bottom part of the sleeve **3077** is located in, or above, the through opening of the bracket **3051** when the sleeve nut **3074** is fully tightened. In the latter case, a width of the through opening may correspond to the width of the shank of the bolt **3064**, as illustrated. Any sleeve length that provides the necessary threading lock-up to provide strong retention of a firearm optic on a bracket may be used in various embodiments.

[0270] Referring again to FIG. **30**A, the bracket **3051** may be fastened to an optic mount of a firearm (e.g., fastened to a slide in this example) using fasteners **3080**, which may be screws retained by threaded openings in the optic mount (e.g., in the slide). In this embodiment, seals **3081**, which may be made of rubber, plastic, or the like (or combinations thereof) are provided around the fasteners **3080**.

[0271] The arrangement of the seals **3081** is different than other sealing arrangements that add thickness between a firearm optic **3070** and an adapter assembly. Specifically, in addition to a face groove seal supplied with some firearm optics (the battery seal is shown as face groove seal **156** in FIG. **1**F), firearm optic manufactures may specify an additional seal layer between the firearm optic body and an optic mount (e.g., a slide), such as sealing plate **151** (FIG. **1**C) and/or some other additional sealing layer that is intermediate between a bottom of the optic and an optic mount. This additional seal layer raises a position of the optic relative to the firearm. For this and other reasons, users may choose to install firearm optics on optic mounts without this additional seal layer. Seals **3081** may be used in this configured to prevent moisture from entering the firearm optic body through the corresponding through openings, without raising the optic relative to the firearm as with firearm installations using the additional seal layer.

[0272] FIG. **30**E illustrates a top view of the slide assembly **3000** of FIG. **30**A. FIG. **30**F illustrates a section view of the slide assembly **3000** of FIG. **30**E taken along section line EE. This view shows that a top end of the sleeve nut **3075** is not above a plane defined by a top of a back end of the body of the firearm optic **3070** (in this embodiment, the top end is 0.02 inches below the plane). Accordingly, the sleeve nut **3075** is not in the user's field of view when the user looks through the firearm optic **3070**.

[0273] FIG. **31**A shows a top view of the adapter assembly of FIG. **30**A. FIG. **31**B shows a section view of the adapter assembly of FIG. **31**A taken along section line BB. The threading lockup between the bolts **3064** and the sleeve nuts **3075** can be seen in this view.

[0274] FIG. **32**A shows a side view of the bracket **3051** of FIG. **30**A. FIG. **32**B shows a section view of the bracket **3051** of FIG. **32**A taken along section line CC of FIG. **32**A. FIG. **32**C shows a front view of the bracket **3051** of FIG. **32**A taken along section line DD of FIG. **32**A. FIG. **32**D is a detailed view EE of FIG. **32**C.

[0275] Referring to FIG. **32**D, the bracket **3051** defines a through opening **3053** and an opening **3082**. The opening **3082** is arranged to receive the seals **3081**. The seal **3081** may form a seal with a part of the bracket **3051** and with part of a length of the fastener **3080** (e.g., with the underside of the head of the fastener **3080** and a non-threaded section of the length of the fastener). The seal **3081** may also form a seal with a part of the optic mount (e.g., with the slide or other firearm component). Therefore, moisture does not enter the space within the firearm optic's seal (e.g., the face groove seal **156** of FIG. **1**F). It is noted that the additional openings on the bottom side of the bracket **3051** (to either side of the openings **3082**) are weight-reducing openings, which optionally may be used in various embodiments.

[0276] In this example, the seals **3081** are torus-shaped. In other examples seals may have any shape that forms a seal

with the optic mount, the bracket **3051**, and/or the part of the length of the fastener (e.g., a non-threaded part of the length) and/or underside of the head of the fastener.

[0277] In this embodiment, the through openings for the bolt shanks re outside the firearm optic's gasket **156**, as illustrated in FIG. **1**F; therefore, seals may not be needed for the bolts **3064**. In other embodiments, it may be possible and practical to use additional seals (not shown) with the bolts **3064**, similar to the use with the fasteners **3075**.

[0278] The seals **3081** may be used in combination with any optic mount, including adapter assemblies and direct optic mounting (where a firearm optic is mounted to an optic mount of a firearm without an intervening adapter assembly). In some examples, the adapter assembly may feature any known mounting system for attaching the optic to the adapter in combination with seals **3081** used with the fasteners that attach the adapter assembly to the firearm. In adapter assembly examples, a through opening in a bracket may be arranged to receive the seals **3081** similar to opening **3082**, and/or to form a seal with the seals **3081**. In direct mount examples, an opening below a through opening in a body of the firearm optic may be arranged to receive the seals **3081** in a similar way, and/or to form a seal with the seals **3081**. In any of these examples, the fasteners for attaching the bracket or firearm optic to an optic mount (e.g., an optic mount on a firearm) may feature surfaces to seal with the seals (e.g., a non-threaded part of the length and/or a smooth underside of the head of the fasteners).

[0279] In this example, the opening **3082** in the bracket **3051** does not have a bottom (e.g., the seal **3081** may be in contact with an underside of the fastener **3080**). In other examples, the seal **3081** may be located in a pocket that includes a bottom defined by the bracket **3051** (FIGS. **34**A-D illustrate such other examples).

[0280] In various embodiments, a pocket or opening for a seal (e.g., a torus shaped seal) may be located on a bottom side of an adapter assembly (below a fastener opening in the adapter assembly). However, in other embodiments, the optic mount (e.g., a slide) may have a pocket for the seal instead of, or in addition to, the pocket or opening in the bottom of the adapter assembly. For example, the fastener holes in the optic mount may be counterbored to create a pocket for the seal. If the seal is locatable entirely in that counterbore when compressed, the adapter assembly may not have any pocket or opening for the seal (or if the seal is significantly taller than the depth of the counterbore, then the adapter assembly may have a shallow pocket or opening to receive a top section of the seal).

[0281] FIG. **32**E is a side view of the fastener **3080** shown in FIG. **32**D. As illustrated, the fastener has a head, threading, and a non-threaded section located between the head and the threading (this is section may seal with the seal **3081**). A width of the non-threaded section may be approximately the same as the width of the inner diameter of the threading, but this is not required (the width of the non-threaded section may correspond to the corresponding dimension, e.g., an inner diameter, of the seal **3081**).

[0282] FIG. **33**A is a side view of another bracket **3351**A with sealing features, according to various embodiments. FIG. **33**B is a section view of the bracket **3351**A of FIG. **33**A taken along section line GG. In this embodiment, a pocket **3382**A is provided by a counter bore on a bottom side of the bracket **3351**A. The seal **3381**A is in sealing contact with the underside of the head of the fastener, part of the length of the fastener, and the part of the bracket **3351**A that defines the pocket **3382**A (the seal **3381**A is shown under compression—flattened from its uncompressed torus shape).

[0283] FIG. **33**C is a side view of another bracket **3351**B with sealing features, according to various embodiments. FIG. **33**D is a section view of the bracket **3351**B of FIG. **33**C taken along section line HH. In this embodiment, a pocket **3382**B is provided by a counter bore in a counter sink on the top side of the bracket **3051**B. The seal **3381**B is in sealing contact with part of the head of the fastener **3080** and with the part of the bracket **3351**B that defines the pocket **3382**B.

[0284] In this embodiment, the seal **3381**B is compressed by the fastener **3380**. In another embodiment, a pocket may be formed around a top of a head of the fastener **3380**. In such embodiment, the seal may be around of top of fastener and compressed by the optic when the optic is mounted to the adapter assembly (the pocket may be formed by making a counter opening that is larger than the head of the fastener—to provide the pocket for the seal).

[0285] FIG. **34**A shows a side view of another bracket **3451** similar in various respects to the bracket of FIG. **32**A, according to various embodiments. FIG. **34**B shows a section view of the bracket **3451** taken along section line HH of FIG. **34**A. FIGS. **34**C-E show side, isometric, and top views, respectively, of the stud **3464** of the bracket **3451**.

[0286] The stud **3464** has a round head, as illustrated. The bracket **3451** includes a round pocket (not shown) arranged to receive the round head, which prevents the stud **3464** from moving vertically relative to the bracket **3451** when a nut (not shown) is being tightened onto the stud threading. A side of the round head has knurling (e.g., straight knurling, which may be formed using any known knurling tool (in this example, the straight knurling may be formed by a straight knurling tool, but other knurling formed with other knurling tools may be possible and practical). The knurling is arranged to prevent to the stud **3464** from rotational movement when the nut (not shown) is being tightened onto the stud threading.

[0287] The head of the stud **3464** may be pressed into the bracket **3451**, which may compress the knurling into the round opening thereby fixably mounting the stud **3464** into the round opening. A nut (not shown), which may be similar to any nut described herein such as nut **3075** (FIGS. **30**A-D) may be arranged to fasten to a threaded length of the stud **3464**.

[0288] In another embodiment, illustrated in FIGS. **35**A-D (FIG. **35**A illustrates a section view similar to section view **34**B), threading may be used instead of knurling. In these embodiments, the stud **3564** may have threading similar to threading of stud **3464** (e.g., one of right-hand or left-hand threading) on one end, a non-threaded section similar to stud **3464**, and an oppositely threaded section (e.g., the other of right-hand or left-hand threading) on the other end. A bracket may have a through opening similar to any bracket through opening described herein, and a threaded opening. The threaded opening may have a threading to mate with the oppositely threaded section on the head of the stud **3564**. The threaded opening may have a width of any size, such as slightly larger than the width of the through opening. The oppositely threaded section on the head of the stud **3564** may prevent rotational movement of the stud **3564** so that a nut may be tightened onto the threading. In the illustrated

example, left hand threading is used on the head of the stud **3564** (and right hand threading is used on the length of the stud **3564**).

[0289] In other embodiments, a threaded post having dimensions similar to the threaded length of the stud **3464** may be integrally formed on a bracket similar to bracket **3451** or any bracket herein (e.g., integrally formed above a solid section of the bracket, rather than passing through a through opening). In such an embodiment, removable fasteners and/or seals similar to any embodiment described herein may be used to attach the bracket with the integrally formed threaded posts to a slide. Any nut described herein may be used with such an integrally formed threaded post.

[0290] The seals **3081** (FIG. **32**D) or any other similar seals described herein may combinationally seal the optic to the optic mount or the adapter assembly with a face groove seal of the firearm optic (e.g., a battery seal). However, some firearm optics may require pressure applied to a battery section of the firearm optic, which may not be provided when a sealing plate or other intermediary layer is omitted. To provide optimal operability with these firearm optics, a top side of any optic mount described herein may define a pocket **3601** (FIG. **36**), e.g., a seal channel, locatable below a battery section of a firearm optic. A seal (e.g., a face groove seal) for the seal channel **3601** may have a lower section locatable in the seal channel **3601** and an upper section outside the seal channel **3601** and arranged to partially protrude from the seal channel **3051** when installed therein, when the battery section pressure is needed. The protruding part of the face groove seal may apply pressure to a battery section of the firearm optic when the firearm optic is mounted to the firearm optic without a sealing plate or other intermediary layer that would raise a position of the firearm optic relative to the firearm. This may eliminate the need for a sealing plate even with firearm optics that specify pressure on the battery section, providing a lower profile optic mounting. In some embodiments, the seal channel **3601** may be used in combination with any other seal described herein. In yet other embodiments, the seal channel **3601** may be used without using the seals described herein.

[0291] Any of the mounting features described herein may be applied to embodiments in which an optic is directly mounted to a firearm. FIGS. **37**A-E illustrate one such example in which the slide includes openings (e.g., key openings) to receive a bolt (FIG. **37**C) similar to any bolt described herein. The illustrated nuts, which may be similar to any sleeve nut described herein, may thread onto the bolts to retain an optic (not shown) directly to the slide.

[0292] FIGS. **38**A-F illustrates a slide assembly **3800** including an adapter assembly **3851** that is slot-mounted to the slide, according to various embodiments. The slot-mounting may eliminate a set of fasteners, and also may locate the optic at a same height as in a direct mount example. In this embodiment, the slot is a T-slot, but in other embodiments the slot can be any shape in which a width of a lower part of the adapter assembly **3851** is greater than a width of an upper part of the adapter assembly **3851**. Also, in this embodiment the adapter assembly **3851** is side-mounted, however, this is not required (in other embodiments it may be possible and practical to mount a slot-mounted adapter assembly from any direction).

[0293] The illustrated optic may be similar to any optic described herein. In this embodiment, the optic is coupled to the adapter assembly **3051** using bolts (which may be similar to any bolts described herein), but in other examples the optic may be coupled to the adapter assembly **3851** using any fastening structure described herein (such as threaded posts, or threaded studs) in a slot-mounting embodiment. Any nuts described herein may be used, as well. In another embodiment, a slot-mountable bracket may have female threaded openings to receive screws inserted into a top of the optic.

[0294] We claim all modifications and variations coming within the spirit and scope of the following claims.

1. An adapter assembly for mounting an optic on a firearm using nuts mountable on bolts, threaded studs, or threaded posts, the adapter assembly comprising:

a bracket having a bottom section to mount to a firearm assembly, and a top side to receive the optic;

wherein the threaded posts are integrally formed on the top side of the bracket, or

wherein the bracket includes:

pockets or threaded openings arranged to mate with at least part of heads of the bolts or shanks of the threaded studs, wherein the pockets or threaded openings are on a bottom side of the bracket; and

through openings to receive shanks of the bolts or a different part of the heads of the bolts, or the shanks of the threaded studs.

2. The adapter assembly of claim **1**, further comprising through openings, to receive fasteners to attach the bracket to the firearm assembly.

3. The adapter assembly of claim **1**, wherein the adapter assembly is arranged to locate a shear plane load associated with recoil across the shanks of the bolts or the shanks of the threaded studs.

4. The adapter assembly of claim **3**, wherein an exterior surface of the shanks of the bolts or the shanks of the threaded studs is threadless.

5. The adapter assembly of claim **3**, wherein the shanks of the bolts or the shanks of the threaded studs comprise threadless parts of the bolts or threaded studs between the heads and the threads of the bolts or threaded studs.

6. The adapter assembly of claim **1**, wherein the threaded openings, the pockets or the through openings are arranged to fix a rotational position of the bolts relative to the bracket, or wherein a bottom end of the threaded studs include knurling or oppositely threaded threading arranged to fix a rotational position of the threaded studs in the pockets when a nut is tightened onto the threaded studs.

7. The adapter assembly of claim **6**, wherein the pockets have a circular profile.

8. The adapter assembly of claim **7**, wherein the through openings have non-circular profile.

9. The adapter assembly of claim **2**, wherein the top side of the bracket defines openings to receive heads of the fasteners.

10. The adapter assembly of claim **9**, wherein the openings comprise counterbores or countersinks.

11. The adapter assembly of claim **1**, further comprising a frame integrally formed with the bracket or fixably mounted to the bracket, wherein the frame is arranged to cover part of a front of the optic when the bracket is mounted to the firearm assembly.

12. The adapter assembly of claim 2, wherein further comprising seals around a part of the fasteners, respectively.

13. An apparatus, comprising:

an optic guard for a firearm, the optic guard including:

a frame; and

a bracket having a bottom section to mount to a firearm assembly, and a top section to receive an optic, the bracket integrally formed with the frame or fixably attached to the frame;

wherein threaded posts are arranged to receive nuts and are integrally formed on the top section of the bracket, or

wherein the bracket includes:

pockets arranged to mate with at least part of heads of the bolts or the studs, the pockets on a bottom side of the bracket; and

through openings to receive shanks of the bolts or a different part of the heads of the bolts, or shanks of the threaded studs;

wherein the frame is arranged to cover part of a front of the optic when the bracket is attached to the firearm assembly.

14. The apparatus of claim 13, wherein the bracket comprises a plate having a first side to mount to a firearm assembly; and wherein the plate includes a second side that is opposite to the first side of the plate, wherein the second side of the plate defines an optic attachment.

15. The apparatus of claim 14, wherein the plate comprises a monolithic plate.

16. The apparatus of claim 15, wherein the frame is integrally formed with a front section of the monolithic plate or fixably attached to the front section of the monolithic plate.

17. The apparatus of claim 13, wherein the bracket comprises through openings arranged to receive fasteners to attach the optic guard to the firearm assembly.

18. An apparatus using a seal or at least one of a bolt, a threaded stud, or a threaded post to mount an optic, the apparatus comprising:

an optic mount; and

a fastener opening arranged to attach, to the optic mount, the optic or an adapter assembly to receive the optic, the fastener opening defined by a body of the optic or the adapter assembly; and

a pocket or opening defined by the optic mount, the body, or the adapter assembly, wherein the pocket or opening is arranged to receive:

a head of the bolt or the threaded stud, or

the seal;

wherein in the case the pocket or opening is arranged to receive the head of the bolt or the threaded stud, the apparatus includes a nut including a threaded hole to mate with threading on a shank of the bolt or the threaded stud;

wherein in the case the pocket or opening is arranged to receive the seal, the seal is in sealing contact with the body or the adapter assembly.

19. The apparatus of claim 18, wherein the nut comprises sleeve nut, wherein when the sleeve nut is fully tightened, a top end of the sleeve nut is not above a plane defined by a top of a back end of the body.

20. The apparatus of claim 18, wherein the seal is torus shaped.

21. The apparatus of claim 18, further comprising a face groove seal located between the body and the optic mount or the adapter assembly, wherein the seal and the face groove seal combinationally seal the optic to the optic mount or the adapter assembly.

22. The apparatus of claim 18, wherein the shank of bolt or the stud includes threading and a non-threaded section between the threading and the head, wherein the non-threaded section sealingly contacts the seal.

23. The apparatus of claim 21, wherein part of the head sealingly contacts the seal.

24. The apparatus of claim 23, wherein the optic mount or adapter assembly includes smooth surfaces around holes, wherein the smooth surfaces sealingly contact the seal.

25. The apparatus of claim 18, wherein the shank of the bolt or the stud includes a non-threaded sheer resistant section between the threading of the shank and an underside of the head, wherein a width of the non-threaded sheer resistant section is not less than an outside diameter of the threading.

26. The apparatus of claim 18, wherein the pocket comprises a seal channel located on the top side of the adapter assembly, and the seal comprises a face groove seal having a lower section located in the seal channel and an upper section outside the seal channel, wherein the upper section of the face groove seal is arranged to apply pressure to a battery of the optic.

27. The apparatus of claim 18, wherein the optic mount comprises a slot, and wherein the bottom section of the adapter assembly is configured to mate with the slot.

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